PAINTING AND DECORATING WORKING METHODS

a text book for
Apprentice
Journeyman
Housepainter
Decorator

PRODUCTED UNDER
THE DIRECTIONS OF THE

INTERNATIONAL ASSOCIATION OF MASTER PAINTERS AND DECORATORS

INCLUDING SUGGESTIONS FROM

EDUCATIONAL BUREAU OF PAINT MANUFACTURERS' ASSN.
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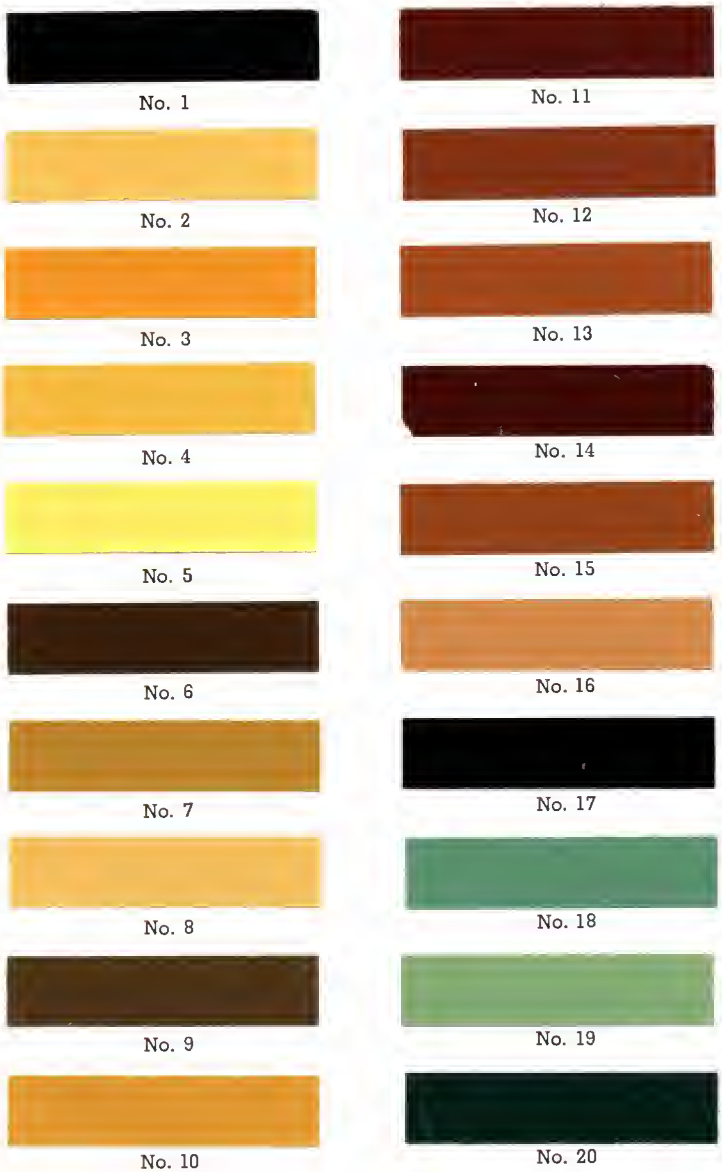
No. 1
No. 2
No. 3
No. 4
No. 5
No. 6
No. 7
No. 8
No. 9
No. 10
No. 11
No. 12
No. 13
No. 14
No. 15
No. 16
No. 17
No. 18
No. 19
No. 20

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PREFACE

For a score of years and more the declining use of the apprentice system, its failure to function adequately, has been under discussion. Ten years ago, at least, the International Association of Master House Painters and Decorators of the United States and Canada began to seek a better method for training young men and others for the painting and decorating business.

Discussion and debate were succeeded by action early in 1920. The association determined to promote a plan for instruction in painting and decorating in established technical schools where other trades were being taught.

The schools approached on this subject took an interested, open-minded attitude, expressing a willingness to establish such courses of study if the association would interest students, outline the work and supply the text book. This task was undertaken. This book has been written to help accomplish these purposes.

A purely altruistic interest in the betterment of the trade, is one of the motives which urges master painters of today to build up a system of training which will provide competent instruction and take up the work of the abandoned apprentice system.

Also a purely selfish interest is a moving force involved, because thoroughly capable and reliable journeymen painters are, indeed, essential to the business success of the master painter employer. Without their brain and brawn he cannot hope to carry on a profitable business.

In the bygone days each master painter considered it his duty to have one or more apprentices in training all the time. He, personally, gave his time to their development. Later the foreman was expected to do this. And now, well no one does it, or at least none but the few exceptionally conscientious masters who hold to the old order. For the most part the changing world has so complicated and speeded-up the employer's work and that of his foremen, that an apprentice gets but scant attention. If he is employed at all, he is necessarily left rather to his own resources to devise the quickest means of obtaining the full

scale of wages paid to journeymen. He learns by imitation, knowing naught of the reasons or principles which make it wise to follow established methods. And the pity is that he can never attain the skill by imitation which is possible by understanding.

So, the purpose of this text book is to help educate boys and young men to be first-class journeymen house painters and decorators. Its scope is purposely limited, knowing that what a first-class journeyman should know and be able to do are absolutely necessary to success later on as master, employer, and business man. With a conscientious study of this course of instruction and careful use of the information, aided by apprenticeship work with an employer, it is quite certain that a student will become a competent and successful workman. Then the whole broad field of master painter, decorator, sign painter, auto painter and employer are open to him, as his ability and desires permit.

No attempt has been made to teach advanced painting subjects, to teach special branches such as sign painting, ornamental design, decoration, automobile painting, nor estimating, contracting and general business information needed by the contractor. All these things come logically *after a man has become a good journeyman.* It is well, then, to do the first things first and become a good journeyman.

The difference in the plan for this book and others on painting subjects, is in the fact that it is not merely an encyclopedia, but a simple, orderly and progressive writing of the complete information needed to accomplish each class of work; taking nothing for granted and assuming that the student knows not even the most simple detail. The whole object in this writing is to assist in the making of thoroughly trained, capable and reliable journeymen. An earnest effort has been made to give the latest and most approved methods for accomplishing good work, such as is called for today, without prejudice or favor for or against any materials, tools or equipment.

The making of a first-class journeyman painter must necessarily continue for some time after completion of any prescribed school course and after a study of this book. It is expected only that in these pages will be found all of the preliminary information needed to accomplish the everyday run of work.

If this work succeeds in fixing in the student's mind the extreme importance of *thoroughness* in one's work, it will have done much. After understanding, thoroughness is most vital. The lack of it ruins more careers than all else. So, absolute mastery of carelessness, plus the will to complete the job, builds a habit of character which will surely succeed. A thorough, careful journeyman of average intelligence is worth much more than a careless one, even though the latter has greater understanding and experience. So, do the job well, do it all and do it neatly.

F. N. Vanderwalker.

CONTENTS

CHAPTER 1

CHAPTER 2

Tools and Equipment

CHAPTER 3

Painting and Decorating Materials

CHAPTER 4

Working Methods for Exterior Painting

CHAPTER 5

Interior Painting

CHAPTER 6

Calcimine and Calcimining

CHAPTER 7

Interior Wood Finishing

WALL PAPER AND OTHER WALL COVERINGS

EXPOSITION OF METHOD

To the Instructor

Undoubtedly the most satisfactory and resultful course to pursue in teaching these subjects, is one which requires alternate study and practice periods. Such a method is followed in the teaching of boys who are to become printers. Every boy spends most of his time in the shop, but a goodly part of each week in school. He ought to put more time in on school work, probably, but the system is better than all school and no shop work.

In the painting business it is not so easy, and perhaps not practically possible often, to divide the boy's time between school and actual practice on the every-day run of work in the shop. Jobs are often far apart. The next best methods to pursue, then, are those which call for study and practice of the working methods right in the school. The actual performance of painting, decorating and all preparatory work is the only method which offers reasonably good returns on the time invested. And it is true that students of the age at hand are anxious for action and lean not too much towards the study of books.

Painting and decorating constitute an extremely extensive field,—in the scope of methods, in materials used, in tools employed and surfaces treated. It is genuinely difficult, in teaching this trade, to avoid diversion to interesting related subjects; yet these are tangent to the "single-track" purpose of this book and the object of the instruction course. Their consideration only tends to confuse the student and dissipate time, because of the complexity of subjects, many of which are extremely technical.

Many jobs of painting and decorating can be accomplished by several methods of procedure, nearly every material is good for some purpose but may be bad for others. Often more than one kind of tool will do well. Apparently well founded differences of opinion are many on most all subjects in this trade, especially concerning the merits of and claims for materials.

There can be no doubt, therefore, that it is wise and necessary to teach but a single, well established method for each class of work, to use time-proven materials and tools

of known usefulness. Then let the student learn of other ways, materials and tools later as he digests first instruction by practical experience.

Keeping one's mind open to progress requires the admission that newer materials, methods and tools probably have merit. It takes more mature and experienced minds than are possessed by students as a rule, however, to differentiate between claims and facts. So, why confuse them with interesting theories, chemical discussions, complex tests, disputed points and technical descriptions?

And it is equally wise that we exclude teaching of advanced subjects,—everything, in fact, except that which is essential to the education of superior journeymen; leaving education of decorative artists, designers, sign painters, automobile painters, contractors and business men for later courses of instruction and for a time after a working knowledge of preliminary subjects has been gained by the student.

There is another excellent reason directing that this course be kept to the single purpose declared to be the object of the course—the making of first-class journeymen painters and decorators. It is the element of time. Few boys in this age will agree to give more than a few months to the academic study of a trade. They are impatient to get to work on the job where the men are doing things. The more simple and direct the course is made the better, so long as it produces good journeymen in the shortest possible time.

CHAPTER 1

LESSON 1

FIRST THOUGHTS ABOUT PAINTING AND DECORATING

What Paint Is: Broadly speaking paint is any white or colored liquid, or thin paste, to be spread on to a wood, metal, brick, stone, cement, paper, leather, glass or other surface for the purpose of protection and decoration.

Paint may be opaque,—meaning that it hides a surface well; it may be semi-transparent, allowing the surface to show through dimly; or it may be so transparent as to hide very little of the surface.

Paint when dry may have a full gloss finish, a semi-gloss (called egg shell) or it may be flat,—that is without gloss.

Paint is composed of:—

Pigment: A dry powder which may be mixed to paste form with oil, turpentine, water or other liquid. Paint pigments are principally white lead, zinc oxide, lithopone, titanox, and tinting colors for oil paints and whiting for calcimine;

Vehicle and Thinner: A drying oil to bind the dry powder pigment particles together and to the surface. The principal paint oil for commercial purposes is linseed oil. No other oil available in quantity can compete with it in service rendered for exterior house painting. Poppy seed oil is used by artists and it is a good paint oil, but the cost makes it prohibitive for extensive painting projects:

Along with the drying oil an evaporating liquid is used to make the paint penetrate the pores of the wood or other surface and to make the paint flow freely from the brush and spread out smoothly on the surface. Pure gum turpentine is the standard volatile thinner for this purpose. It evaporates completely as the paint becomes dry and after it has performed its duty of helping the brushing and penetrating of the paint;

Color: A dry colored pigment powder,—such as red, blue, yellow, green, brown or black usually mixed to paste form with an oil, evaporating thinner, varnish or water and

glue by color manufacturers. The color paste is added to a paint pigment base (which is usually white) by the painter in order to make a colored paint. These colors are derived from mineral, animal and vegetable sources. Some are made by chemical processes;

Drier,—or Japan: A liquid added to the paint to hurry the drying. Old fashioned driers were made in paste form and are still used to some extent in Europe. Modern driers are in liquid form.

Why Is Paint Used? The **first** purpose served by paint is the protection of the surface from destruction by the natural elements—rain, snow, wind, sun, heat, cold and frost. Paint arrests decay of wood by sealing up the pores and keeping out moisture; Paint protects metal by preventing the formation of rust (corrosion). Paint preserves brick and cement walls by keeping out moisture. If moisture should enter and freeze, the expansion would cause cracking and crumbling. This is what paint prevents.

The **second** purpose served by paint is that of decorating a surface, to color it for the sake of beauty, to make a wall harmonize in color with other furnishings in a room, to make a surface radiate good cheer and happiness because of the influence color has on our nerves. Painting gives a uniform, even appearance to a surface by covering and hiding light and dark portions. Painting gives a surface an even gloss, a semi-gloss or a dead flat appearance, as wanted.

The **third** purpose served by paint is that of sanitation. Paint possesses antiseptic, germ-killing properties. And further, it promotes sanitary, healthful homes by the thorough periodical cleanings given surfaces by painters in preparing for painting and decorating. Sanitation is also promoted by painting because a smooth, washable surface upon which germs do not so easily congregate, is given by the painting.

The **fourth** purpose served by paint is that of light reflection. Dark rooms are made lighter by painting. Light colored paints reflect and better distribute both artificial and day light. Making rooms lighter adds to the comfort, health and happiness in all homes, while reducing the cost of artificial lighting.

Why Paint Is Glossy,—or Flat: The principal paint pigments—white lead and zinc oxide—are dry powders having no gloss whatever. Of the paint vehicles, linseed oil and most varnishes dry with a gloss, but tur-

pentine and benzine and water, used as vehicles, cause the paint films to dry without gloss—because they evaporate entirely.

Now when you mix together these materials:—a pigment which is without gloss, a liquid which dries with a high gloss (linseed oil) and a liquid which dries without gloss (turpentine),—the resulting paint has, when dry, a gloss or flat finished surface according to the **proportion,** or the amounts of each of the liquids used.

What is commonly called a full gloss paint would result from adding to the pigment paste about one-fifth turpentine and four-fifths linseed oil. A semi-gloss (egg-shell gloss) finish would be mixed with about one-third turpentine and two-thirds linseed oil. A flat finish would come from adding thinners in about the proportion of one-fourth linseed oil and three-fourths turpentine.

What Varnish Is: A rather thick liquid composed principally of resins or fossil gums which have been dissolved by heat in drying oils; then the thick gum paste is thinned with volatile thinners such as turpentine or mineral spirits. The term, varnish, includes Japans, shellacs and lacquers, although the last two usually contain no oil.

The characteristics of varnish are these. Spread onto a wood, metal, glass, painted, enameled or varnished surface, varnish dries to a hard, smooth and glossy finish much harder than paint, but usually less elastic. Varnishes make a thick coating which withstands wear better than paint on some kinds of interior surfaces. This surface can be rubbed down to a very fine, smooth finish. Varnish is sufficiently transparent to permit the under surface color or grain figure to show through.

What Enamel Is: Enamel is practically a combination of pigment and varnish. It consists of pigment such as zinc oxide, plus varnish for a binder. Colored enamels are of substantially the same composition as white enamel, with colors added. Enamels are made which dry with a full gloss finish and also with a semi-gloss called satin finish.

Enamel alone does not hide the surface quite so well as paint. Several coats of opaque white paint are, therefore, put on before enamel. Enamel dries with a much greater gloss than paint, with a thicker, harder film and withstands wear much better on interior surfaces. It makes a smoother surface than paint and one which, like varnish, can be rubbed to a fine finish for polishing.

What Stain Is: Stain is usually of a very fine, transparent or semi-transparent color pigment in a liquid such as water, turpentine, mineral spirit, alcohol, varnish and others. There are oil stains, water stains, spirit stains and varnish stains. The color pigments are of various origin,—some are natural earth pigment colors, some are chemically made, some are made from dye woods, some come from coal tar products, most of these latter are called aniline dyes.

The purpose served by stains is that of coloring the surface without hiding it. This is true of all except the varnish stains which often hide the surface, color it and fill the pores at the same time.

How Paint and Varnish are Put On: Most paint and varnish spread today are put on with the commonly known bristle paint brush by the hand method.

But in industrial painting, varnishing and enameling work in factories, the articles to be decorated are often dipped instead of brushing on the paint; that is, the merchandise such as metal goods, hardware, machine parts, toys and the like are dipped in a great quantity of paint in a tank. The excess paint drips off and the coating dries in the open air, or in baking ovens under moderately high temperature. In some cases the paint, varnish or enamel is flowed on, the material being pumped through a hose and flooded on like a stream of water from a garden hose.

Of more interest to the student, however, is the air-brush spray method of putting on paint, varnish, water colors or other materials. It is gaining a wider use every year both for industrial painting and in the painting of large unbroken surfaces of buildings. The bulk of the automobile and furniture manufactured today is painted, enameled and varnished by the air-brush spray painting method.

Briefly, the operation of the spray machine is this: The paint is put into a tank. It runs through a hose into a metal "gun", with a spray nozzle. Into this gun a hose conveying compressed air also leads. When a trigger on the gun is pulled the air strikes the paint or varnish and throws it out through a very small hole in the nozzle of the gun in the form of a fine spray and onto the surface being decorated.

The air-brush has been so perfected as to be perfectly practical from the mechanical standpoint. And the sur-

face of furniture and machinery coated by this method is undoubtedly finished in a better manner than can be done by hand brushing. It shows no brush marks, is cleaner and more uniformly covered. This at least has been amply proven on factory finishing of merchandise where painting conditions are easily controlled as to temperature, ventilation, moisture and cleanliness.

The use of the air-brush for painting outside surfaces on homes has not as yet been extensive. Probably enough has been done along this line, however, to point to a steady and certain progress from year to year in painting by this method.

QUESTIONS ON LESSON 1

1. What is Paint? Can you paint on glass?—on brick?—on sheet iron?
2. Name the four principal elements of paint.
3. What is a paint pigment?
4. What is the chief paint thinner or vehicle?
5. Why is turpentine put into paint? How long does it remain in paint?
6. What is the purpose served by linseed oil in paint?
7. Name the four classes of colors with reference to their origin.
8. What service does drier perform in paint?
9. What is an egg-shell finish on paint?
10. Name the four principal reasons for painting.
11. What is varnish? Does it dry as hard as paint?
12. Does varnish hide the surface?
13. Can you spread varnish over a varnished surface?—on metal? —on glass?
14. What is enamel? Is enamel always white? Does it always have a high gloss?
15. Will one coat of enamel hide a surface as well as a coat of paint?—as well as a coat of varnish?
16. Why is paint glossy? If you mix paint with one-fourth turpentine and three-fourths linseed oil will it dry without any gloss? What proportion of oil do you put into paint to make it dry semi-flat?
17. What is stain? Is it supposed to hide the surface?—to fill it?
18. Is there any way to put paint on to a surface other than with a brush used in the hand?
19. Is varnish always applied with a brush?

CHAPTER 2

LESSON 2

BRUSHES—VARIOUS KINDS

Brushes are now made by the better class of manufacturers to best do the work expected of them, and in the selection of the kinds and lengths of bristle employed, their use is the determining consideration. Some manufacturers claim this advantage or that in construction, or in a patented method of setting, but most of these claims are academic. The following represent the general classifications into which brushes used by the house painter and decorator may be grouped:

1—Flat Paint, either metal or leather bound
2—Oval Paint and Varnish
3—Flat Sash, or Trim
4—Oval Sash
5—Flat Varnish
6—Flat Calcimine
7—Dutch Style Calcimine
8—Whitewash
9—Round and Flat Dusters
10—Flat Artist, or Fitch

These various types of brushes are hereafter listed, and illustrated with brushes used by many classes of painters, as a matter of information, with a general notation of the general purpose for which the brushes are used. No attempt will, however, be made to defend any particular style or to especially recommend any particular size of brush. Painters are no more notional than any other class of mechanics, still the advocates of leather bound flat paint, or stucco brushes, as they are erroneously called, condemn the metal bound brushes as amateurs' tools, while another group will use nothing else. Some painters will recommend a flat brush of one size for some specific work for which his associate will not use it at all. In one part of the United States one type of brush will be popular almost to the exclusion of another kind, while in other sections of the country the same brush is practically unknown.

Therefore, the purpose for which the brushes are suit-

able, is cited, leaving the selection of the particular brush and size to the individual. Experience will in a short while indicate with which size brush the best and most work can be done. Some men with a 3½″ brush will do more and better work in a day than will others with one 4″ wide. Let the amount of work done decide the size of brush to use. Do not be influenced by those painters who desire merely to put in time and use a boy's brush to do a man's job.

Brushes in the old days were made in many ways and settings not now in use. They were bound with twine or wire, with leather or metal; they were set in glue or cement. Today most of the brushes are bound with leather or metal, and set in cement or vulcanized in rubber. The vulcanized in rubber method of setting bristle has been perfected until it is practically fool-proof, and such brushes can be used in any liquid or vehicle without fear of the bristle coming out. Brush makers' cement is made principally of shellac cut in alcohol. Such brushes should, of course, never be used in shellac or other spirit varnishes or stains.

Flat Paint Brush, Figure 1: A Chinese bristle metal bound flat paint brush with a beaver-tail handle, a fairly stocky brush. Made in half inch sizes from 3″ to 5″ with bristle from 4⅛″ to 4⅞″ long, according to width. The 4″

Fig. 1

brush with bristle 4⅝″ in length is of the proper proportion. This brush is suitable for the application of all kinds of paints on all kinds of surfaces. Do not use it for applying varnish. Buy it vulcanized in rubber.

Flat Paint Brush, Figure 2: A Chinese bristle metal bound flat paint brush with a peerless style handle. Made with less stock than the brush just described. Made in half inch sizes from 3″ to 5″ with bristle 3⅝″ to 4⅝″ in length,

according to the width of the brush. The 4″ brush with bristle 4⅛″ long is of the proper proportion. This brush is suitable for the application of all kinds of paints on all

Fig. 2

kinds of surfaces. Do not use it for applying varnish. Buy it vulcanized in rubber.

Flat Paint Brush, Figure 3: A Chinese bristle leather bound flat paint brush. This brush is best made with a thin handle, which is more comfortable to use. It should contain more stock than a metal bound brush. It is made in half inch sizes from 3″ to 5″ wide. There is a great diversity of opinion as to the length of bristle this brush should have. Experience suggests a 4″ brush with 4¾″ bristle as giving the best and most economical results.

Fig. 3

This brush is suitable for the application of all kinds of paints on all kinds of surfaces. It should not be used in applying varnish. Buy it cement set.

This brush is generally called, though without authority, a stucco brush. It should be made solid, that is, with the bristle extending through the entire depth of the leather strap. Do not buy plugged "stuccos," or so-called solid center "stuccos." The only recommendation of such brushes is their low-price. They have no place in a painter's kit.

Flat Paint Brush, Figure 4: A Chinese bristle metal bound flat paint brush built around the handle in the manner of a leather bound brush, with an open center; a vulcanized in rubber brush of very recent design. It is claimed to have all the advantages of both the leather bound and

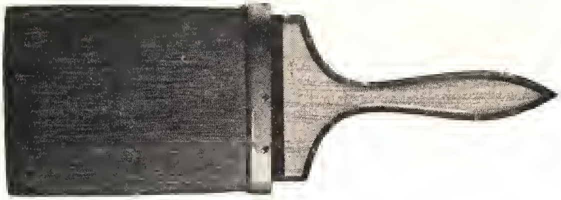


FIG. 4

metal bound brushes with none of the disadvantages of either. These brushes contain about the same weight of stock as the leather bound brushes and are made in widths from 3″ to 4½″ in half inch sizes. The 4″ brush should have bristle 4¾″ long to be of the proper proportion.

Oval Paint and Varnish Brush, Figure 5: A Chinese bristle oval paint or varnish brush, developed from the old style round paint, or pound brush as it was called, but in every way superior to it. Made chiseled. Made both solid and open center, but the open center brushes are in every way the better tools, having a greater working length of bristle. They are much more easily kept from getting

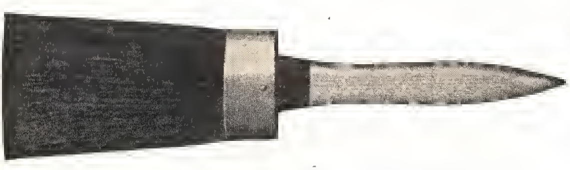


FIG. 5

"lousy" and do not require a bridle to keep them in shape, even when new. They are excellent brushes for either exterior or interior painting, or for varnishing large surfaces.

They are made in several sizes usually designated as 6 to 10. The number 10 size of one dependable manufacturer is an oval 2-5/16″ in greatest width and has bristle 4⅝″ in length.

Oval Varnish Brush, Figure 6: A Chinese bristle oval varnish brush of the open center type; a splendid brush preferred by many to the more modern flat varnish brush. It

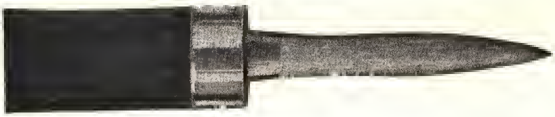


Fig. 6

is made in many sizes of which the more popular are usually designated as 4/0 to 10/0. The 8/0, a popular size, of one manufacturer is an oval 2-1/16″ in greatest width and has bristle 3¾″ in length.

Flat Sash Brush, Figure 7: A Chinese bristle flat sash, or trimming brush as it is called. Chiseled like a flat varnish brush, but it is thinner. Do not get these brushes too

Fig. 7

thick; you cannot trace the sash as well with a brush too thick. It is made in sizes 1″, 1½″ and 2″ wide. The 1½″ brush should have bristle 2⅛″ long to be of the proper proportion. The bristle should be vulcanized in rubber.

Oval Sash Brush, Figure 8: A Chinese bristle oval sash or trimming brush, chiseled, with the bristles vulcanized in

Fig. 8

rubber. Made in sizes from 1 to 10. The No. 8 brush of one manufacturer is an oval brush 1⅛″ wide and has bristle 2⅛″ long.

Flat Varnish Brush, Figure 9: A Chinese bristle flat varnish brush, chiseled, with the bristle vulcanized in rubber. A brush ideally suited for the application of varnishes

and enamels to all kinds of surfaces. Made in widths from 1½″ to 4″ in half inch sizes. The 3″ brush should measure 3⅜″ bristle to be of the proper proportion.

Fig. 9

This brush is frequently used in trimming narrow surfaces. The 1½″ size is especially popular for this purpose.

Flat Varnish Brush, Figure 10: A Chinese bristle flat varnish brush of the so-called XXX China type. It is thicker and stubbier than the brush just described. It was one of the first flat varnish brushes designed and still has many friends. It is chiseled and should be vulcanized in rubber. A splendid brush for the application of stains and varnishes, but not as well suited for enamels as the brush above. It is made in widths from 1½″ to 3″, and in the

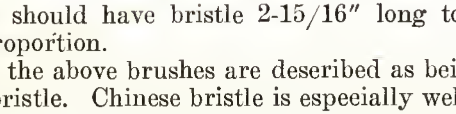


Fig. 10

2½″ size should have bristle 2-15/16″ long to be of the proper proportion.

All of the above brushes are described as being made of Chinese bristle. Chinese bristle is especially well suited for brushes of their kinds, is less costly, equally effective and more economical. Brushes of this type are also made of Russian, either yellow, white or gray and of French bristle, but they are more expensive and do not have enough advantage to offset their cost.

Flat Calcimine Brush, Figure 11: A Russian bristle flat calcimine brush, bristle vulcanized in rubber in a galvanized iron ferrule. Calcimine brushes should be made of stiff Russian bristle and nothing else; Russian bristle being heavier in texture than Chinese bristle holds its stiffness in a water vehicle better, and having a much heavier and

broader flag carries more calcimine. Calcimine brushes are made of either all yellow or all gray bristle, or gray bristle

FIG. 11

cased with yellow. The color of the bristle has nothing to do with the working properties of the brush. Yellow bristle being more expensive and having nothing other than its color to recommend it, we advise the use of all gray bristle brushes. They cost less and are equally as serviceable as the more expensive brushes. Made in 6″, 7″ and 8″ sizes. The 7″ brush should have bristle $5\frac{1}{4}$″ long. Do not try to buy calcimine brushes with stock which is too long. When a brush is longer than $5\frac{1}{4}$″ the stiffness and texture of the brush is sacrificed for length—a poor economy.

Dutch Calcimine Brush, Figure 12: A gray Russian bristle calcimine brush set in "continuous" rows, vulcanized in rubber. The brush is made in three sizes with various lengths of bristle in all sizes. The sizes are $2\frac{3}{8}$″ x $7\frac{1}{4}$″, $2\frac{3}{16}$″ x $7\frac{1}{4}$″ and $1\frac{3}{4}$″ x $7\frac{1}{4}$″. The most economical length of bristle is 5″. In buying these brushes be careful to avoid those containing China bristle mixtures.

FIG. 12

Dutch Calcimine Brush, Figure 13: Calcimine brushes like those just described are best adapted for decorating smooth or skim coat finished plastered walls. Wherever rough plaster is to be finished by all means use a calcimine brush of the so-called Dutch type. It is the only brush well suited for this purpose. Formerly these brushes were made with the bristle set in little knots with pitch in a wooden block. This method of setting, which was more or less insecure, has almost entirely given away to vulcanized in rubber types. Two styles of brushes are illustrated below.

FIG. 13

A gray Russian bristle Dutch calcimine brush with the bristle set in knots and vulcanized in a solid rubber block. It retains the advantages of the knot setting. The rubber block will not warp or split and the bristle will not pull out. The most economical length of bristle is 5″. The brush is, however, made in shorter lengths.

FIG. 14

Whitewash Brush, Figure 14: A whitewash brush made of gray Russian bristle with an outer casing of yellow bristle, leather bound and set in cement. A brush 9″ wide should measure 5″ in length.

Fig. 15

Whitewash Brush, Figure 15: A whitewash brush of stiff black pure Chinese bristle, metal bound and cement set. A brush 8″ wide is satisfactory when the bristle is 4″ long.

Whitewash brushes are usually used for the application of whitewash or exterior cold water paint, although in some sections of the country they take the place of the flat calcimine brush. Care must be exercised that the lime used in the whitewash is thoroughly slaked before putting the brush into the mixture or the life will be burned out of the bristle.

Duster Brush, Figure 16: There are many kinds and varieties of painter-dusters; dusters made round and flat in various sizes; dusters made of various kinds and mixtures of Russian and Chinese bristle; but the house painter usually finds the flat duster the more practical type. Dusters

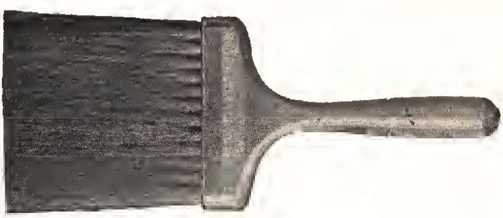


Fig. 16

are made pitch set, wire drawn or vulcanized in rubber. The vulcanized in rubber brush is the economical one to buy, because it can be cleaned in gasoline or turpentine, or washed with soap and water without affecting the setting.

A vulcanized in rubber flat painter-duster made of a mixture of Chinese bristle, horsehair and fiber. A practical and inexpensive brush. It is 4¼″ wide and has stock 4¼″ long.

Flat Artist Brush, Figure 17: A brush designed for the use of the sign painter or decorator. Made either of White French, or Black Chinese bristles, chiseled, metal

bound, and cement set. Made in 1/8" widths from 1/4" to 2". The 3/4" size should have bristle 1 1/4" long.

Fig. 17

Fig. 18

Roof Painting Brush, Figure 18: A brush designed especially for painting large roof surfaces. Made preferably of gray Russian bristle, leather bound and double nailed. It is attached to a long handle and used like a sweeping brush. It is made in 1/2" widths from 7" to 9". The more popular size, 7" should have bristle 3 1/2" long.

Fig. 19

Roof Painting Brush, Figure 19: A type of roof brush, lower in cost than the one above described, made of less expensive bristle and usually mixed with a percentage of horsehair. Used successfully in painting metal roofs with mineral paints and in applying tar. Made in two knot, three knot and four knot sizes. It has stock about 3 1/2" long.

Wall Stippling Brush, Figure 20: It is almost impossible to paint a smooth plastered wall with an ordinary oil paint, get a pleasing texture and have it free from brush marks. Wall stipplers are used to pound or stipple the paint while wet; this gives it a somewhat porous appearance and eliminates all marks of the brush with which it was applied. Walls painted with the

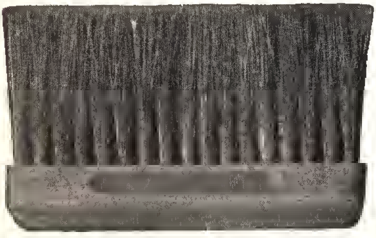


Fig. 20

modern prepared flat wall paint do not require stippling. Stippling brushes are made of stiff gray Russian bristle drawn into the block with copper wire. The bristle should measure 3½″ clear of the block.

Wall Stippling Brush, Figure 21: One manufacturer has perfected a stippler, which, having the bristle vulcanized in a hard rubber block, permits the use of much more bristle. A brush of this type will wear indefinitely, and do much faster and more efficient work. The bristle measures 3½″ clear of the block.

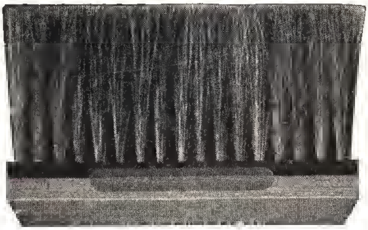


Fig. 21

Fig. 22

Waxing Brush, Figure 22: Waxing brushes are made of Tampico or fiber, stapled into a solid block. They come in 15 and 25 pound sizes. They are used for finishing after wax has been applied to floors. This 25 pound brush is equipped with felt protectors to keep from scarring the wash and base boards. The size of the block is 7¼″ x 9¼″.

Flowing Brush, Figure 23: An ox hair flowing brush made of pure ox hair, cement set. Comes in widths from

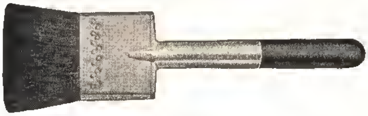


Fig. 23

1″ to 3″ in half inch sizes. Generally used in the double thickness. This brush is especially adapted for fine enameling.

Flowing Brush, Figure 24: A fitch flowing brush made of black Chinese bristle and skunk hair, commonly

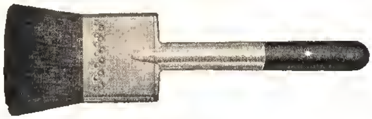


Fig. 24

called fitch hair. Used by furniture factories for various kinds of finishings on furniture.

Flowing Brush, Figure 25: A badger flowing brush with a casing of badger hair and the middle a mixture of badger hair and French bristle, very elastic and generally used by automobile finishers in applying colored varnish and finishing coats.

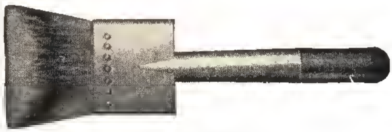


Fig. 25

The various mixtures used in flowing brushes, the elasticity of the bristle or hair and the thickness or size of the brush depends entirely upon the surface to be covered whether the material is light or heavy in body. The brushes listed above are rarely used by the house painter and are shown as a point of information only.

Flat-Color Brush, Figure 26: A color brush made of pure squirrel hair, the trade name of which is camel hair,

Fig. 26

brass bound, cement set. It is used chiefly for the application of Japan colors when a smooth surface is desired. Made in widths from 1″ to 3″ in half inch sizes.

LESSON 3

THE SELECTION, CARE AND USE OF BRUSHES

The brush is as important as the paint or varnish: on nothing does success in the application of paint and varnish depend more than on the brushes used. A common fault among painters is an indifference in the selection of their brush tools. A carpenter could not be expected to work successfully with a saw or plane which would not hold its edge, and still, the purchase of a brush without any regard to its fitness for its work is too frequently made. Improperly selected or badly kept brushes will ruin the best job. The best advice that possibly can be given to the young painter is to buy good brushes and take care of them.

Buying Brushes: Brushes whose only recommendation is cheapness should never be purchased, the more costly brushes are usually the least expensive; they not only enable better work to be done, but enable it to be done with less effort and fatigue, and they have far greater "mileage." They give a considerably smaller total brush cost. By buying brushes of the better sort, the total year's brush expense will be much less regardless of the initial cost.

The making of brushes has been developed to a scientific art, and it is just as technical a process as the making of modern paint and varnish products. While the information regarding what is used in the manufacture of good brushes is interesting and well to have, nowhere does the old adage that "a little knowledge is a dangerous thing" apply with more significance than in the selection of brushes. The materials of which good brushes are made is mentioned as a matter of information, but until after the experience of years, do not attempt to select brushes from appearance alone. The only safe method to follow is to select the types of brushes best suited to the job in hand and then go to a reliable dealer in good paint materials, buy the best brush of the kind he has or recommends and pay the price he asks for them. Money "saved" in the purchase of brushes usually proves to be very elusive. Buy only good brushes and take care of them.

The Making of Brushes: Brushes used in general house painting and decorating are, with a few exceptions

which will be mentioned, made of the bristle of swine. Nature furnishes us with no other material even partially so well suited for paint application. Bristle holds its elasticity (springiness) in liquid paint vehicles as no other material will; it tapers from the butt (the part originally attached to the animal hide) to a split end, or "flag" as it is called, which not only holds paint in the brush but spreads it evenly and without brush marks; it resists abrasion, wearing to a really remarkable degree. Paint, varnish, enamel and calcimine brushes should be made of pure bristle.

The bristle used in making brushes comes principally from China and Russia, the specie of swine, the climatic and other conditions under which they live producing bristle best suited for the various purposes. American bristle is totally unfit for painters' tools and is never used. Our swine are bred for food, and cared for as they are, nature does not provide them with the long heavy coat with which she covers the Russian and Chinese species.

The bristle which is suited for brushes is of many kinds, and the selection of stock for the brush is a scientific task, one governed entirely by the work for which the brush is to be used.

The art of brush making in America has been developed to a degree not approached in other countries, and although there are but a few manufacturers of good painters' tools even here, the best are available, though heed this counsel: buy only such kinds or brands of brushes as have been proven by experience to be suitable, or take the advice of a dependable dealer. But buy **good** brushes and take care of them.

Brushes of the inferior sort are made of poor grades of bristle which may be soft and flabby or too tapered. They are made of "raw" bristle, that is, bristle which has not been straightened. As soon as such brushes are put into paint they twist and curl, making good work impossible. They are made of bristle adulterated mostly with horsehair, though sometimes Tampico is used in the worst of them. These inferior and adulterated brushes are sometimes so cleverly camouflaged that it takes an expert or the test of the paint pot to detect them. There are many so called tests which are offered even by painters of some experience to tell bristle from horsehair and

fiber, but advice to the young painter is to ignore them and not attempt to be too clever in his discrimination.

The true test of the worth of a brush is the paint pot, and when a brush fails to deliver that which was promised when purchased, avoid that brand in the future.

Brushes, like anything else that is "made", sometimes develop defects in workmanship. The better manufacturers guarantee their brushes and will gladly replace such brushes that are returned to them.

All new brushes, whether the bristle is set in cement or vulcanized in rubber, will probably shed a few bristles which were not caught when the brushes were made. Before putting any brush into paint or varnish work rub the hand forth and back across the bristle and work out those few loose ones. Do not be too quick to condemn a new brush that sheds a few bristles.

Brushes for Painting Metals: Brushes which might contain materials other than bristle have been spoken of. Brushes which are to be used in painting structural iron or steel may advantageously contain a small percentage of horsehair. Horsehair makes such brushes less elastic, but as the paint does not have to be worked into such surfaces there is no objection, and since horsehair better resists abrasion than does hog bristle, a small amount tends to increase the life of the brush. Such brushes should not be used for applying paint to wood surfaces.

Also the best of paint-dusters may contain a small amount of horsehair, and even fiber, when it is intelligently used, adding to the working qualities of the brush.

The Care of Brushes: Second in importance only to the selection of brushes is the care given them after they have been put in work. Just as it is impossible to do a perfect job of painting, varnishing or calcimining with brushes made for some other purpose, or with brushes made to sell at a low price, so is many a job made inferior or ruined altogether by brushes which have been improperly kept. Good brushes of any kind are costly and it is obviously poor economy to buy good brushes and then not take care of them.

Never keep your brushes in water is an axiom which every young painter should adopt and religiously follow. It is a practice among many painters of even excellent reputation to keep paint brushes in water, but all accomplished by doing so is to prejudice the successful application of paint and put money into the pockets of the brush manufacturers. Keep brushes out of water.

When paint and varnish brushes are not in use, they should be suspended in raw linseed oil free of the bottom of the container at least two inches and to a depth of at least an inch above the bottom of the ferrule or strap. The addition from time to time of a little turpentine, or ether, or similar thinner will keep the oil from getting fatty. Linseed oil, being the natural paint solvent, will tend to clean brushes suspended in it in this manner, and brushes so kept will always retain the natural springiness of the bristle. Water, on the contrary, is not a paint solvent, it tends to make brushes "lousy" and makes bristle soft and flabby. The very best of brushes will be ruined in it.

Brushes should be suspended free of the bottom of the container, because when they are allowed to rest on the bottom the weight of the brush tends to bend or curl the ends of the bristle and ruin the brush. The bottom of the ferrule or strap should be below the surface of the oil, for otherwise the oil will dry around the exposed part of the bristle tending to make the brush lousy, or shortening the actual working length of the brush.

Every good shop should be provided with a suitable tub or tank in which brushes can be thus kept. Small portable containers of smaller capacity should be carried to any job of considerable size, and at the end of each day's work all brushes should be taken from the pots and suspended in the brush keeper (well named—it really keeps the brushes). The simplest way to suspend the brushes is to drill a small hole through the handle of the brush near the top of the ferrule, and putting a wire through it, let the wire lay across the edges of the container. Brushes made by some manufacturers have this hole drilled in the handle when the brush is made.

When brushes are suspended in linseed oil the oil will dissolve the pigment, which being heavier will sink to the bottom of the container, thus cleaning the brush. The pigment so accumulated can be utilized. From time to time clean the containers, using the oil and pigment in the paint, and supplying fresh oil for the keepers. Since the oil and pigment are usable, there is practically no cost for material, and the saving in brushes will be quite substantial. Do not put brushes into water. There is no possible excuse or reason for its use.

On the small job, when no container is available, work as much paint out of the brushes as is possible, lay the

brush on a flat surface and wrap it in paper, but be careful not to bend the bristle. Any paper will do, but a glazed or nonporous paper is to be preferred. Lay the wrapped brushes out flat, don't stand them on end. This method is only a makeshift however, and is suggested only as an emergency substitute for the brush keeper.

Varnish brushes should of course be kept in separate containers, and should have the oil thoroughly washed out of them before they are put into varnish again. If the oil is not entirely removed it will have a tendency to interfere with the drying of the varnish. Varnish brushes on the job may be suspended in the varnish in which they are being used. Be careful, however, that the brush does not rest on the bottom of the bucket and that the varnish comes above the bottom of the ferrule.

The young painter may doubt the wisdom of such care of his brushes, especially when so many painters do not follow the suggested practice, but all the time and money spent in following these suggestions will be returned a hundred fold.

Brushes, which through neglect have been permitted to harden or have had their bristle bent or twisted out of shape, might just as well be discarded. It is cheaper than attempting to reclaim them. There are chemical preparations offered which claim to clean hardened or lousy brushes but ruined brushes are seldom restored successfully. Take care of the brushes—that's the real economy.

Stippling brushes should frequently be cleaned of the wet paint with turpentine or other suitable thinner. Under no condition should the paint be allowed to harden. Never let a stippling brush go over night without its cleaning.

Calcimine brushes should be thoroughly washed in clean water after each day's work and hung up, bristle down, to dry. Never start a job with a damp calcimine brush. The best of them will be soft and flabby and fail to deliver the expected work. It is better to work calcimine brushes in pairs, using them on alternate days to insure their starting out absolutely dry. These suggestions apply to dutch as well as to flat calcimine brushes. The practice of letting Dutch brushes rest on the edge and the tip of the handle should not be followed. They should be hung bristle down; otherwise the butt end of the bristle may not be entirely dry and the brush will be wanting in springiness.

Whitewash brushes, especially those made leather bound, are the bane of the manufacturer as well as the

painter, and many are returned to the maker because they shed, when all that is wrong with them may be charged to the neglect of the painter. When they are in calcimine absorbing the water vehicle the bristles swell and stretch the leather binding to its greatest extent; later, when they are allowed to dry out, they are found to be loose in the setting. If they are permitted to absorb whitewash until they swell again, they will not shed. No brush manufacturer can guarantee leather bound whitewash brushes against shedding when they have not been used intelligently.

Avoid putting bristle brushes into hot whitewash. Many so-called cold water paints contain unslaked lime; do not put brushes into such mixtures until they have cooled and started to "jell." Wash the brushes thoroughly as soon as possible after such jobs. Hot lime will burn and utterly ruin any bristle brush.

Keep duster brushes clean. Those made vulcanized in rubber are easily cleaned in benzine or other solvent, or may be washed with soap and water. Do not clean pitch set brushes with either a paint solvent or with hot water; the solvent will dissolve the pitch, the hot water will soften it —in either case the brush will fall to pieces.

Buy good brushes, use them intelligently and take care of them.

The Use of Brushes: Just as the character of work, whether upright, ceilings or floors, the nature of the surface and the kind of paint or varnish product used, determines the brush best suited, so does the selection of a brush determine the way in which it is to be used.

Hold the brush in such a way that a free and easy wrist motion can be combined with the action of the arm. Do not grasp the brush or hold it as though afraid that it is going to get away. Hold it firmly but lightly. Do not put the fingers on the side of the brush *below* the edge of the ferrule or strap. The hands will get unnecessarily smeared, but, exerting more pressure on the center of the brush, it will wear it into a fishtail shape. Good brushes are made with the various kinds of bristles they contain thoroughly mixed. When a brush wears out more in one part than another the mechanic is to blame.

When using oval brushes do not let the brush turn in the hand, it will wear it to a pointed shape and destroy its usefulness.

When using flat brushes avoid working them along the narrow edge. This may save the few minutes required

to change to a trimming brush, but it will also wear the corners round and spoil the shape and working efficiency of the brush. Use the tip or flags of the brush; do not try to paint or varnish with the sides of brush. By doing that it will wear it to a razor edge.

Bristles and other brush materials will gradually wear away from the abrasion of the surface with which they come into contact. The appearance of a brush after a short period of service is the best index of the intelligence of the painter. It is also true that when brushes are being held so that they wear evenly they are being held properly for the paint or varnish application.

Do not poke brushes into corners and around mouldings or other trimmings. That will ruin a brush. That will bend or turn over the flag end of the bristle and make it unfit for good work. It is impossible to get the bristle straightened out until it has worn out the bent part, and in the meantime the brush is sloppy. When painting grill work or ornamental iron, or similar surfaces, select an old brush that is nearly worn out and let it finish its usefulness there.

Use a duster to clean surfaces before attempting to apply either paint or varnish; that is what the duster is for. Brushing over dust or dirt on the surface will spoil a job and the brush as well.

Proper paint and varnish application is dependent as much upon the brushes used as the mechanic who uses them. Buy good brushes and take care of them. When brushes are made there are always a number of shorter bristles or other hair which do not get into the setting. Every good brush manufacturer makes an honest effort, with special machinery devised for the purpose, to beat or comb out all this loose bristle, but with all the care exercised it is sometimes impossible to avoid a few loose bristles in a new brush. Do not condemn a new brush, regardless of its setting, if it sheds a few loose bristles.

In all well made brushes the bristle is carefully washed and boiled, but during the many operations that follow in the making of the brush they are bound to accumulate dust and dirt. A few minutes spent in working this dust and the short loose bristles out of a brush will save much annoyance and perhaps unjust condemnation of the brush later. Hold the brush in one hand and work the other forth and back across the bristle end until the dust and loose bristles have been beaten out before putting brushes into work.

New brushes should not be used for final coats of paint or enamel. Use new brushes in priming coats. Keep them free of dust and they will work themselves free for the finishing coats. It is a very good practice to wash new varnish brushes in some inexpensive thinner, such as benzine, before putting them into varnish. This solvent, of course, should be thoroughly shaken out of the brush before it goes into varnish.

Before attempting to apply paint to any surface work the brush well into the paint, or, more properly, work the paint well into the brush.

Hold the mixing paddle tightly over the rim of the bucket, dip the brush into the paint to a depth of two or three inches, then wipe the brush clean, across the edge of paddle. Do this several times to insure having the brush filled with the paint to be used.

Now apply the paint. Dip the brush into the paint to a depth of two inches or so, lift it out of the paint and tap it lightly against the side of bucket, then carry the brush to the surface to be painted. Avoid dipping the brush too deeply; a brush has a certain paint capacity, and if more paint is carried with it than this capacity the paint will drop all around the job, or if working overhead it will run down the handle and on to the hand.

It is the flag or split end of the bristle which carries the paint, and when dipped deeper than these flags it overloads the brush. Good paint brushes are made with these flag ends distributed back from the face of the brush to a length determined by its type. If brushes are made with the stock all of one length and very toppy or full at the face, although they may seem and feel very heavy, they have little capacity and when dipped even lightly into paint the paint will run down the smooth bristle toward the ferrule of the brush, even if turned slightly upwards. Such brushes are "leaky" and might just as well be discarded. Half the time will be spent in trying to keep the hand or brush clean.

Ordinary common sense and the understanding of what painting means will tell just how the real brushing is done,—just remember that paint must be brushed in, not merely laid on the surface. Saving elbow grease may ruin the job, but do not try to "ride" the brush or lay the brush too flat on the surface: cultivate a free and easy stroke of pressure, and let the wrist do most of the

work. While rubbing the paint in, cover the surface evenly, working with the grain of the wood. Lay the paint off, taking up the sag and runs especially near the surface edges.

QUESTIONS ON LESSONS 2 AND 3.

1. What are good paint, varnish, enamel and calcimine brushes made of?
2. What part of the brush carries the paint? How deeply should a brush be dipped?
3. Is horsehair or fiber ever used in good brushes? Why?
4. Name the types of brushes a good painter requires.
5. What should be the length of bristle on a good 4″ metal bound flat paint brush? a 4″ leather bound flat paint? 1½″ flat sash? a good 2½″ flat varnish brush?
6. Name two good types of calcimine brushes. What kind of bristle is preferred? What color?
7. What must be done to all surfaces that are to be enameled, varnished or painted?
8. What sort of brush should be used for painting ornamental iron?
9. What should be done to every new brush?
10. Why should brushes never be kept in water?
11. What is the proper way to care for brushes?
12. How should varnish brushes be kept?
13. What care should be given calcimine and whitewash brushes every day?
14. Should a damp calcimine brush ever be put into work? Why?
15. What must be avoided in using whitewash or cold water paints? Why?

*   *   *   *   *   *   *   *

CHAPTER 2

LESSON 4

SCAFFOLDS, LADDERS AND OTHER TOOLS

There are two excellent reasons calling for thorough knowledge of ladders, stages, jacks and other scaffolding devices and their proper use. The first reason is the very first law of nature—self preservation. Your life depends upon your knowledge of this equipment and its use. Ignorance of methods and correct use of equipment, as well are carelessness, lead to self destruction or physical suffering, at least.

The second reason making this knowledge necessary concerns the time and cost of doing a job. When scaffolding is necessary, its handling often takes more time than to apply the paint. Then there's a sense of security which goes with the correct and sound scaffolding equipment which speeds the painter's work, insuring the maximum yardage of surface properly coated, and without extra labor. Likewise it contributes to the boss's peace of mind, which is worth something. Accidents are costly to everybody mentally, morally and financially, to say nothing about physical suffering. Most of them can be avoided.

Scaffolding equipment in common use will be illustrated in the following pages and described. The best use of such equipment will be presented in lessons later on where working methods are presented in detail.

Much equipment for scaffolding has been invented in recent years. Some of it has but limited use for special jobs and circumstances. Only that will be described which has proven itself of quite general use.

Long Ladders: These are of the common type as shown in Figure 26. They are used to reach most areas to be painted on exteriors of buildings. Practically all surfaces on one and one and one-half story bungalows and cottages are reached with these ladders without using a swing stage. Also they are often adequate for two-story houses. Of course, one can work faster from planks or platforms on large surfaces; so time is saved by not using long ladders often, even where they reach easily.

These are made of sound Norway pine, as a rule, with

turned hickory rungs mortised into the side rails and nailed there. Lengths are: 8, 10, 12, 14, 16, 18 and 20 feet.

Extension Ladders: These are practically the same type as Long Ladders, plus mechanical devices shown in Figure 27 which permit fastening two or three long ladders together, one atop of the other to make them one extremely long ladder.

The two-section ladders reach from 20 to 40 feet. The three-section ladders reach from 30 to 60 feet.

Some extension ladders have small wheels set into the side-rails at the top of the upper section. These permit the upper ends of the ladder to roll up freely against the side of the house as it is being raised from below.

Windlass Extension Ladders: There is an English type of extension ladder which has a windlass in the bottom section to raise the upper sections by winding the crank, instead of pushing the upper sections up by hand as is commonly done with ordinary extension ladders. A rope is tied to the upper section of ladder at the bottom. Then the rope is passed through a pulley or block at the top of the lower ladder section. Turning the windlass handle winds the rope up and raises the upper ladder easily. See Figure 28.

Rope Extension Ladders: These are made like Figure 28 but without the windlass. A rope is tied to the bottom rung of the upper ladder, is thrown over the top rung of the lower section. By pulling on the rope the upper section is raised. A locking hook device—Figure 29—is bolted onto the inside of the side-rails at the bottom of the upper ladder, as shown in Figure 28. These hooks take hold of the rungs of the lower ladder as the upper ladder is hoisted up into place. Of course, the double roller top iron shown in Figure 27 is used too on the top of the lower ladder.

Before the invention of these mechanical devices, painters tied two or three long ladders together on the ground with rope. Then the long ladder thus formed was raised up by hand. It is a difficult and awkward task. The new extension ladders, note, are raised against the wall while the two or three sections are folded, one over the other. The upper sections are then raised vertically, sliding their ends against the wall as they go up.

Trestles: These are the two-sided ladders used mostly for interior work, though they are handy too for certain

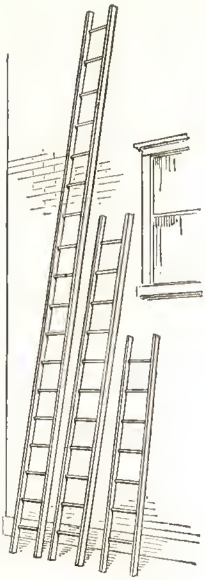


Fig. 26
Long Ladders

Fig. 29
Lock

Fig. 27
Extension Ladders

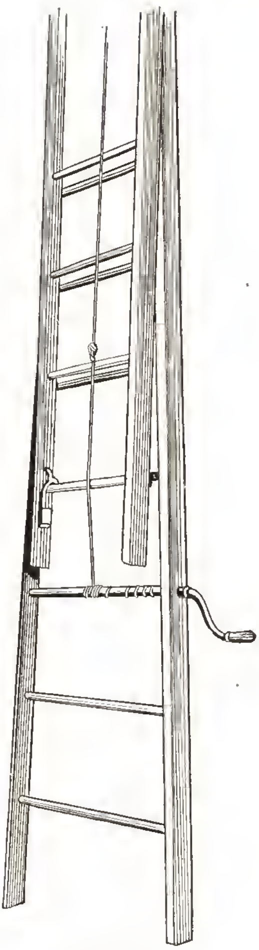


Fig. 28
Windlass
Extension
Ladder

Fig. 30
Trestle

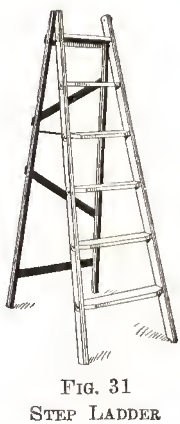


Fig. 31
Step Ladder

exterior painting tasks. A plank placed on any rung of one and extended to that of another makes a splendid scaffold from which to paint a side wall. Four or six trestles with planks between them make up a scaffold from which a ceiling can be easily reached.

Trestles are made substantially like long ladders. Two are hinged and permanently fastened together at the top. Made in lengths of 6, 7, 8, 10, 12, 14 and 16 feet long. See Figure 30.

Painters' Step Ladders: Figure 31 shows that this ladder is quite like the trestle but has wide, flat steps on one side only instead of round rungs on both sides. When it is necessary to work from a ladder this step ladder is more comfortable because the steps are wider than the round rungs on the trestles and so do not tire the feet so quickly. The sizes of step ladders are: 5, 6, 7, 8 and 10 feet long.

Extension Planks: Instead of using ordinary building planks—2x10's, there are times when the improved extension planks shown in Figure 32 are time savers. They are strong and lighter than ordinary planks in weight. Made in three sizes: 6 feet closed, opens to 10½ feet; 8 feet closed, opens to 14 feet; 10 feet closed, opens to 17½ feet. All are 11 inches wide.

Steel Ladder Shoe: See Figure 33. This is a simple little device for use on long ladders which have no more certain footing, sometimes, than a cement sidewalk or brick pavement.

Ladder Rung Repair Plate: See Figure 34. Many of the accidents which occur on ladders in and out of the painting trade are due to broken or rotted-out rungs. These metal plates make a permanent repair easily and quickly.

Ladder Brackets: Figure 35. Made in various styles. Some fasten to the rungs. This one attaches to the siderails. It is not, therefore, likely to depend upon a defective rung and so it is safer. They are used as shown on the outside of the ladder to hold a plank at the top of two extension ladders in painting roof cornices. It is possible to swing these brackets to a position on the under side of the ladders. There they make an excellent scaffold from which to work on a wall or window frame.

Roof Ladder Hooks: Figure 36. These fasten on to the ladder rungs and hook over the ridge of the roof, giving a secure position to one while painting a roof.

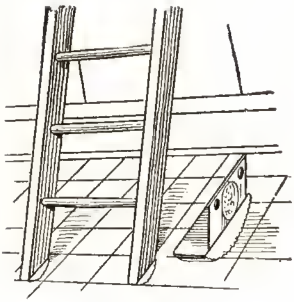


FIG. 33
STEEL LADDER SHOE

FIG. 34
LADDER REPAIR PLATE

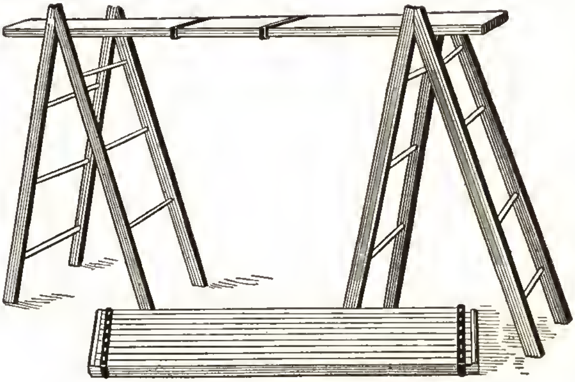


FIG. 32
EXTENSION PLANK

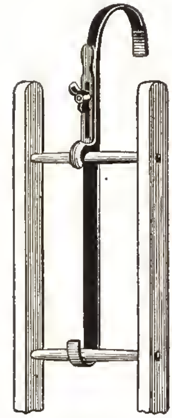
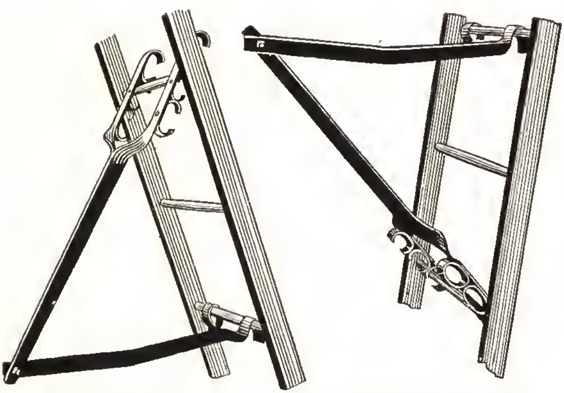


Fig. 36
Roof Ladder Hook



On Back of Ladder *On Top Rung of Ladder*

Fig. 35
Ladder Bracket

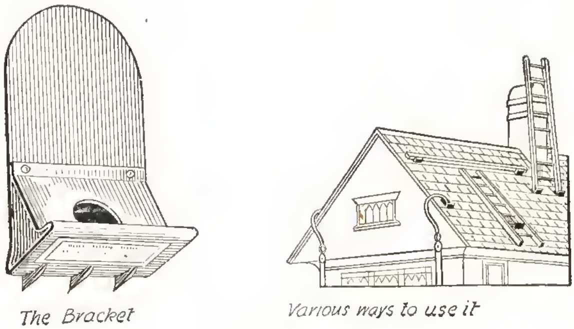


FIG. 38
ROOF BRACKETS

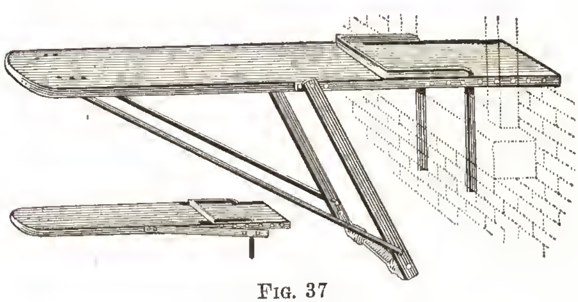


FIG. 37
WINDOW BRACKET

Window Bracket: Figure 37. An extension plank which fastens to a window sill from the inside. Used where there are many upper-story window sash and casings to be painted outside on brick buildings. A faster way to work than with swing stage on windows too high to reach with a ladder.

Roof Brackets: Figure 38. Used on shingle roofs as indicated by the illustration, when painting or staining roofs.

Swing Stage Safety Stirrups: Figure 39 explains this metal stirrup and guard-rail device which is designed to take the place of rope stirrups. Built of wrought iron to comply with state, city and labor union safety regulations. These are now very generally used in place of the old-fashioned rope rigs.

Figure 40 illustrates another style stirrup made of metal with support for guard rail at back.

Swing Stage Scaffolds: Figure 41 shows the old fashioned rope stirrup rigging. The scaffold as a whole consists of a platform twenty inches wide and from ten to twenty feet long. (This platform is an especially strong ladder with planks secured to the rungs.) Cross bars, the timbers under the platform constitute the lower part of the stirrups. They have roller wheels in the ends which are in contact with the building. Then there are the rope stirrups which fasten the cross bars to the lower block as shown in the picture. The falls (pulley blocks and ropes) and the cornice hooks like Figure 42 complete the scaffold.

The Cornice Hooks are of hand forged steel and are tested to stand a tensile strain of 1800 lbs. The rings in the upper ends of these cornice hooks are used to tie a rope into. The rope is then made fast to a chimney or other safe hold while the hooks rest on the cornice of the roof.

Swing Stage Ladder Brackets: Figure 43. Used on upper end of two extension ladders in place of cornice hooks, where the building is not too high. The upper blocks are hooked on as shown in the picture and the stage platform swings between the ladders and the wall.

Gasoline Blow-Torch: Figure 44. This is the common form of blow torch familiar to all mechanics. It is used by the painter to burn off paint which has cracked and scaled. It is filled with gasoline and pumped full of air. There is a pump in the handle. The intensely hot flame directed on to a painted surface causes the paint to blister.

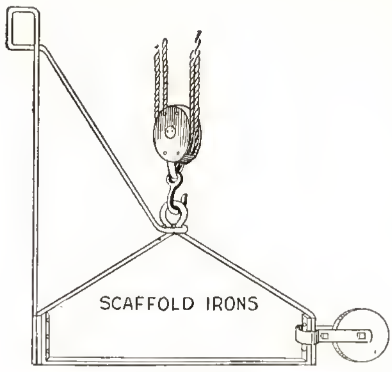


FIG. 40
SWING STAGE SAFETY STIRRUP

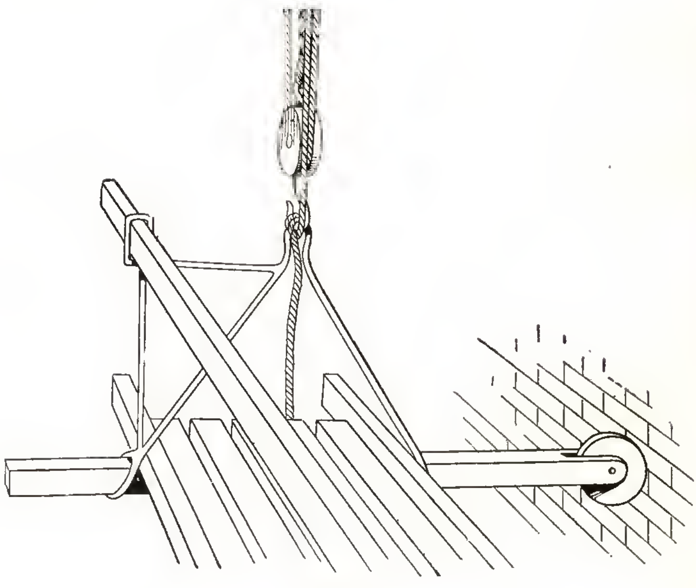


FIG. 39
SWING STAGE SAFETY STIRRUP

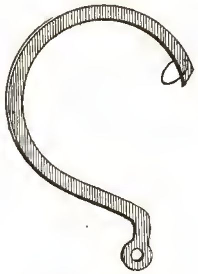


Fig. 42
Cornice Hook

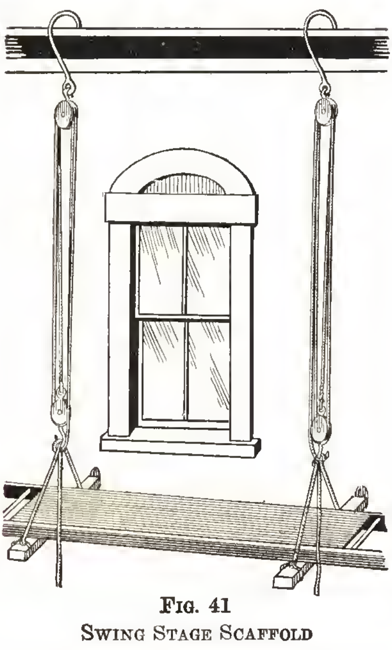


Fig. 41
Swing Stage Scaffold

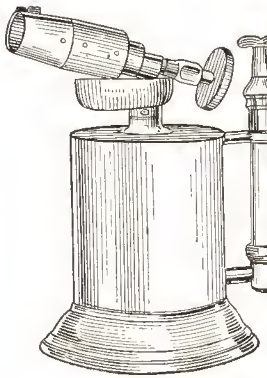


Fig. 44
Gasoline Blow Torch

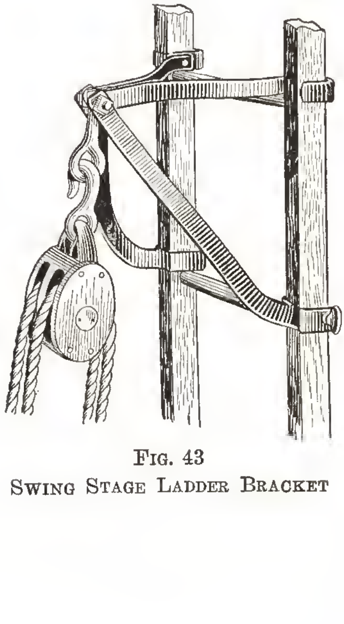


Fig. 43
Swing Stage Ladder Bracket

Then it can be scraped off. The method for performing this work will come in later lessons.

Putty Knife: Figure 45. A fairly flexible, flat steel blade 1¼ inches wide. Used for glazing—that is, placing putty on to window sash to hold the glass in place. Also a general utility tool used for cleaning and scraping off paint, dirt, etc. on all work.

Scraping Knives: Figure 46. Really a wide putty knife. Comes 2½ to 4 inches wide and is used for scraping off paint from old surfaces when the paint has cracked and sealed or blistered.

Felt Rubbing Pad: Figure 47. Used to rub the gloss and roughness off of painted, enameled and varnished surfaces with pumice stone and water or oil for very fine polished finishes. Size: 2¼ in. wide and 6 inches long.

Extension Brush Holder: Figure 48. There are places, one finds occasionally, which are very difficult to reach even with a ladder. For example high places on poles and stack and chimneys. Also there are places which are so obstructed with pipes or some other objects as to be difficult or impossible to reach by ordinary methods. Then this pole brush holder saves time.

Paint Strainers: Figures 49 and 50 illustrate two of several kinds of strainers used. Of course, most painters simply tie a piece of cheese cloth over a pot and strain through that. Figure 49 is paper and cloth intended to be used once or twice and then destroyed to avoid cleaning. Figure 50 has a removable metal bottom which can be cleaned or replaced easily.

Paint Mills: Figure 51. Not so commonly used now as in years gone by. Yet, in a well equipped shop the paint mill finds many uses. In mixing putty, grinding and mixing colors, working over old paint skins to be made into paint for rough work the paint mill has its place. Paint mills come in four sizes:—¼ to 3 gallon capacity and for hand or power operation.

Paint Mixing Machines: Figure 52. For mixing paints, pastes, calcimine, fillers, enamels and lead and oil paint. Made in two sizes—5 gallon and 12 gallon capacity. They mix faster than by using a paddle and make a more thorough job of it.

Paint Spraying Machines: Figures 53, 54 and 54½ show the equipment used in painting by means of the compressed air spraying equipment. It consists of a gasoline engine, or electric motor driven portable air com-

Extension
Brush
Holder

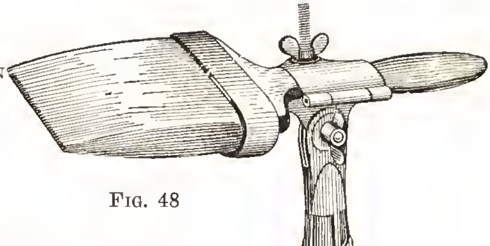


Fig. 48

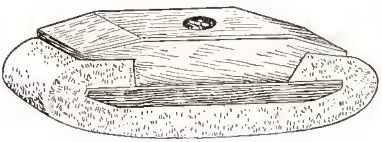


Fig. 47
Felt Rubbing Pad

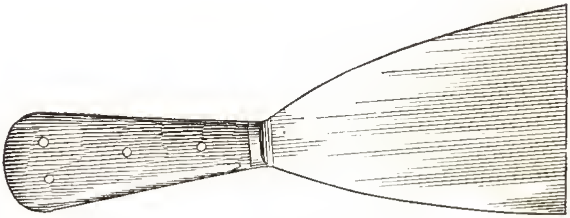


Fig. 46
Scraping Knife

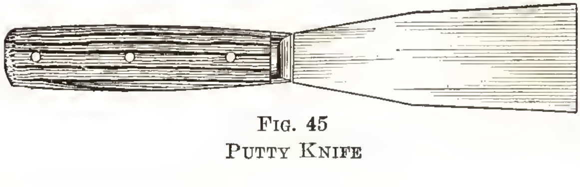


Fig. 45
Putty Knife

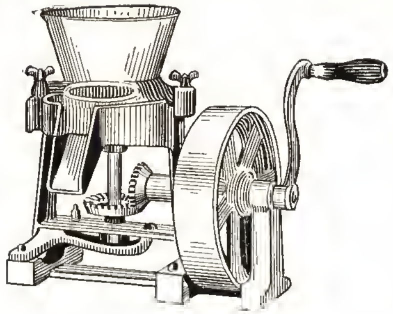


Fig. 51
Paint Mill

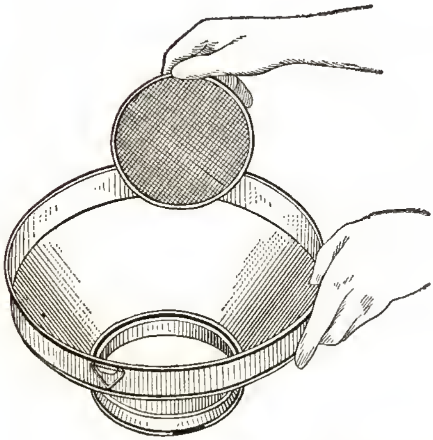


Fig. 50

Paint Strainers

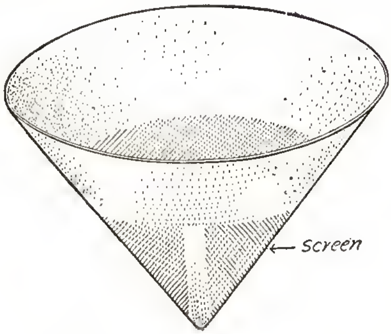


Fig. 49

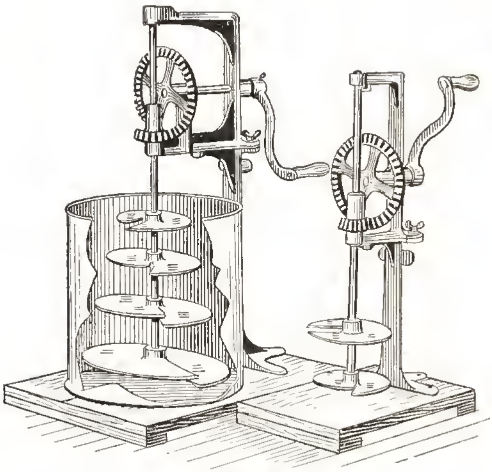


Fig. 52
Paint Mixing Machine

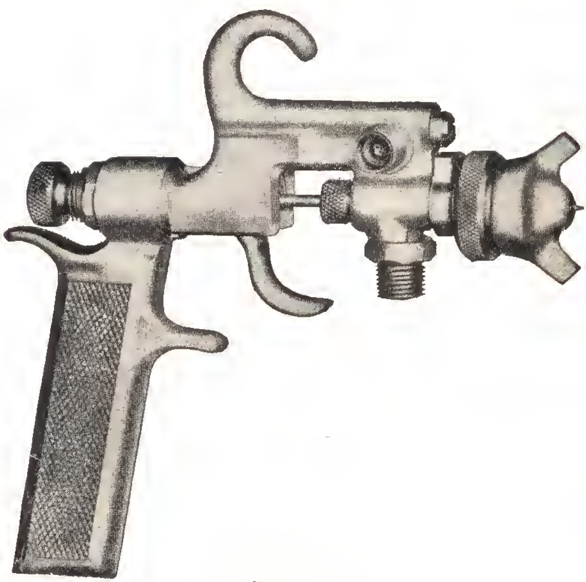


Fig. 53
Air Brush

FIG. 54
SPRAY PAINTING SYSTEM IN USE

pressing outfit, a storage tank for the paint, air and paint hose and the spray gun or hand piece. By means of a regulating valve, compressed air is admitted to the tank containing the paint at varying pressures depending on the weight and viscosity of the material and the height of the work. This pressure forces the paint through a hose to the spray gun which the operator holds in his hand. Compressed air from another regulating valve passes through a second hose to the spray gun. By means of a finger trigger on the gun the paint is released at the nozzle and atomized by the compressed air. The result is a fine spray of paint which can be controlled by the pressure on the trigger with your finger. The gun is held from six to twelve inches from the surface and played back and forth, each stroke coating a strip of varying width, depending on conditions. Laps are easily made, as the spray fades out at the edges. With a little practice the spray can be perfectly controlled and any feasible thickness of paint film applied. In some cases the spray-gun is fitted with an extension handle, to reach high walls and ceilings without ladders and scaffolds.

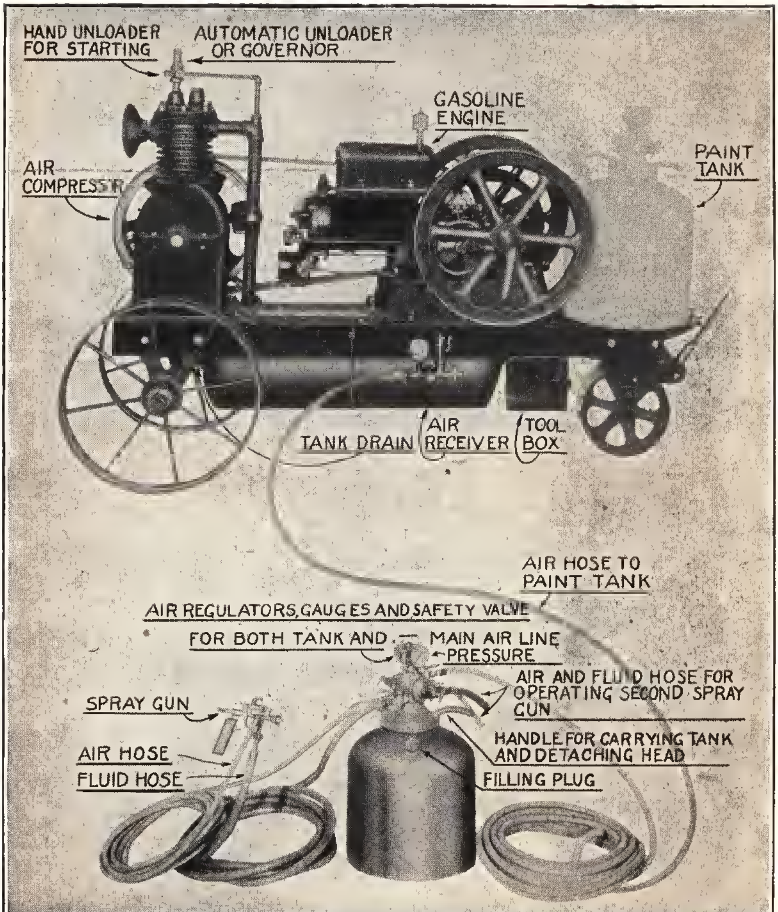


Fig. 54½
Detail of Mechanical Painting Equipment

The Spray System is used very extensively in factory painting and varnishing of merchandise, such as furniture, hardware, automobiles and hundreds of other products. It is employed to a large extent for coating building interiors with mill white and water paints, also for the painting of bridges, steam and electric railway cars and equipment, oil and water tanks, stucco, brick and concrete building exteriors. It is not so widely used on exterior frame house painting as yet, but promises to be of more service along this line in the future.

The paint spray spreads the paint without brush marks, of course, and when skillfully handled no laps, joints, runs, sags or thin places are to be seen. The claims made for this device as to economy of use are principally a saving of labor to the extent of one-fourth or more and also of time required. Much scaffolding is eliminated. Some of the tests run with the machine show a remarkable saving in time and labor, but about a ten per cent increase in material used over what would have been used by brushing the paint out in the ordinary way by hand.

QUESTIONS ON LESSON 4

1. Why should you be careful about building scaffolds, using ladders, ropes and stages?
2. What kind of a ladder would you use to paint the outside first story wall of a residence? How would you reach the roof cornice?
3. When is a swing stage used? When is an extension ladder needed?
4. What is a trestle? How is it different from a step ladder?
5. What is an extension plank? How used?
6. What is a ladder bracket?
7. Describe a cornice hook.
8. What is a blow-torch used for by a painter?
9. What is a paint mill?
10. Where have paint spray machines been used mostly?

CHAPTER 3

PAINTING AND DECORATING MATERIALS

It is doubtful if any other trade is called upon to use so many different materials as are necessary in the painting business; nor to meet such varying working conditions as exist in the every-day run of surfaces to be painted and decorated.

For this reason an intimate knowledge of certain materials is essential and at least a fair acquaintance with many others. So a brief outline of the characteristics of each of the principal materials follows in this lesson. Such facts as are set forth are drawn from the experience of master painters of today and are impartial. They represent the experience of a majority of master painters who are interested only in results.

There are painters who will not agree with all that is said about materials here. And quite naturally, too, some manufacturers whose special interests cannot be promoted here will not agree to all that is said. The information set down, however, is conservative, is based on experience in the field and is correct in the main. Whatever merit other materials have for the purposes mentioned, or for other purposes, their presentation ought to be made elsewhere. Their consideration in these lessons does not help the purpose of this instruction which is limited to educating apprentices to become first class journeymen painters and decorators. It is thought wise to present only such materials as painters use and handle directly as such.

LESSON 5

PAINT PIGMENTS

White Lead: Known also as basic carbonate of lead. It is manufactured by several concerns, and while there are slight differences in the qualities of various brands in the matter of whiteness, opacity (hiding power) fineness of texture and in uniform composition, they are all of value to the painter.

White lead is one of the most opaque white pigments known to chemistry which are suitable for exterior and interior painting. It is the product of a chemical process.

Metallic lead (the ordinary lead metal such as is used in making water pipes, but more refined) is corroded, or changed in physical form by subjecting it to the action of acetic acid and carbonic acid gas. These three principals —metallic lead, acetic acid (strong vinegar) and carbonic acid gas are the basis for manufacturing all white lead (basic carbonate). The different manufacturers simply put them together in different ways and by different machinery.

The majority of all white and light colored house paints which are capable of protecting an exterior surface for a reasonable time, contain a substantial proportion of white lead.

For generations serviceable paint has been made by the painter himself by simply mixing together pure white lead, pure linseed oil, turpentine and drier for white paint. Colors are added for tints, of course. Thousands of painters, especially those of mature experience and who have served time learning the trade, continue this practice.

There is one criticism of this kind of paint commonly admitted. It is this—white paint made this way and put onto surfaces of extreme exposure to the sun may chalk off. That is, the paint loses its gloss after a year or two and becomes a fine white powder which can be brushed off like dust to some extent.

To overcome this tendency to chalk, in some climates about 25% of zinc oxide is added to the paint, except for the priming coat. The zinc with the white lead makes a harder wearing surface. If too much zinc is put in, the paint is likely to crack and scale. All paint must wear out sometime and in one of two ways; it will either chalk off or crack and scale off. Moderate chalking is preferred to scaling because you can paint over a chalking surface without any preparatory work. A surface upon which the paint has cracked and scaled must be burned over with a blow-torch and the paint scraped off before repainting is safe.

White lead combines readily with linseed oil, works easily and smoothly under the brush, and increases the drying properties of linseed oil. It is a natural drying pigment in itself.

White lead is a dry white powder which is mixed with pure linseed oil by its manufacturers, making a paste containing 92% white lead and 8% linseed oil. The

painter uses it in this form mostly, although the dry white lead powder is also used extensively for making putty. Basic lead sulphate or basic sulfate white lead, often known as "sublimed white lead," is accepted in United States Government specifications on a par with basic carbonate white lead.

Oxide of Zinc: A white pigment made from zinc metal. Technically, zinc oxide is a combination of one atom of metallic zinc with one atom of oxygen. It is produced by two methods, one known as the French process and the other as the American process. Zinc oxide is a product of combustion. The zinc metal, being burned in a furnace, combines with oxygen and changes to a fine white powder.

In texture zinc is the finest of all white pigments and the color of the best grade is the whitest. Being so very fine it bulks greatly. A pound of dry zinc fills a space much larger than a pound of white lead dry. In consequence of its extreme fineness it requires more oil than white lead to fit it for spreading with a brush.

Zinc is not affected in color by any gases present in the air and has no effect upon any pigment with which it is mixed.

Zinc is a dry white powder which paint manufacturers mix to a paste form with pure linseed oil. That is the form in which it is used by painters. It is somewhat harder than white lead, just as the zinc metal is harder than lead metal.

Zinc, as such, is used by painters principally for mixing enamels by adding it to varnish with a little white lead. It is used also in house paint by the painter to make a harder coating, and a whiter coating.

Most of the zinc used in the paint industry is used by manufacturers of prepared house paints and enamels.

Used alone with commercial linseed oil as an exterior house paint it makes a coating which is rather too hard and inelastic to expand and contract with the wood during temperature changes. The paint might crack and scale off if made this way. When reinforced with other pigments it makes good paint.

LITHOPONE.

Introduced in England some fifty years ago as Orr's White. Production started in the United States about

twenty-five years since, and now amounts to about 100,000 tons a year.

It is a precipitated compound of barium sulphate (blank fixe) and zinc sulphide. A very dense white pigment, it forms the white base of most flat wall paints. The ordinary grades turn gray in sunlight, but recover their color in the dark. In the best grades this defect has been eliminated.

Paints made with it have great body and hiding power.

Titanium Pigments: Titanium is the name of an element existing in an ore widely distributed throughout the world. This ore is used in the production of white titanium oxide, a pigment having greater hiding power than any other white pigment known. Titanium pigment has great hiding power in oil. When exposed alone, it will chalk rapidly. When mixed with zinc oxide, a sound film is obtained. A paint made of titanium pigment with up to 30% of zinc oxide has given excellent service on several years' test. It remains white and in excellent condition for repainting. Titanium oxide is non-toxic. It is also gas-proof and does not darken.

Titanium-zinc paste paints, for master painters use, are available on the market. Instructions for reduction with oil, turpentine and drier are placed on the labels of the packages in which they are sold to the painter.

Whiting: Known also as calcium carbonate and bolted whiting. A finer grade is called Cliff Stone Paris white, also gilder's whiting.

This pigment is a fine white powder made by crushing limestone and floating off this chalk on water. The finer lump chalk portion floats and the coarse particles, with impurities, sink to the bottom. It is then dried and comes to the painter as a dry, fine white powder. It is used by the painter principally today as the base for calcimine and for making putty with white lead. Plaster of Paris, which is sulphate of lime, is used with water to fill cracks in interior plaster walls.

Red Lead: Oxide of lead is its other name. Made by melting lead metal in large saucer-shaped kettles and holding it in melted condition by heat until it takes up oxygen from the air and slowly changes to a fine red powder. The first powder formed is a very light, pinkish yellow called litharge. Kept at a certain temperature with free access of air for a longer time this litharge takes on a deep, bright red and is called red lead.

Red lead made by roasting white lead is called orange mineral.

Red lead is used by painters in the dry powder form and also in a paste form ground in linseed oil. The painter mixes the dry powder with linseed oil and it makes one of the best known paints for metal surfaces such as struetural iron, bridges, tanks and machinery. Red lead is also sold in paste form like white lead, having been mixed to that state by the manufacturers with linseed oil. It is also used in making high grade prepared paints for painting on metals.

Red lead is not generally used as a color for tinting white paint. It fades rather quickly when exposed to the sunlight. The fading, however, does not impair the proteeting qualities or serviceability of red lead.

Graphite: Also called plumbago and black lead. This is one of natures products—a carbon mined from the earth like lead and zinc ores. Some graphites are composed of decomposed stone containing over 90 per cent of iron.

After the manufacturing process, which means the mining, cleaning to separate from impurities and grading, a soft, black, dry pigment with a metallic sheen results. It is used much for lubricating machinery after being mixed with grease. It is used also for lead peneils.

The dark and varying color of graphite limits its use as a paint pigment, although it is permanent from the standpoint of protecting the surface. The dry graphite and usually some silica are mixed with linseed oil and used to paint structural iron, metal roofs and machinery, usually over a priming coat of red lead.

Bronze Powders: These are pigments made from such metals as copper, brass, zinc and aluminum. They are not chemically changed to make a powdered pigment but rather the metal is rolled out by machinery into very thin flat sheets. The change from metal bars, or ingots, to thin sheets is merely a ehange of physical form, the same as when bars of steel are rolled into the flat sheets of blaek iron one sees about every tin shop. Bronze powders, then, are simply powdered metals.

The very thin sheets of aluminum, copper or brass are crushed in power mills until a fine powder is formed. This powder is then mixed with what is called "bronzing liquid", which is really a very thin varnish. Only enough bronze powder is mixed with the liquid to assure the proper covering or hiding of the surface. The resulting

paint is used for decorating radiators, pipes and machinery.

There are many grades of bronze powder, some of which are finer than others and some retain their brilliant color longer than others: No. 1,000 is a rather coarse grade for machinery and rough work; No. 6,000 is fine and is suitable for all decorative work; No. 10,000 is the finest grade. Some bronze powders retain their color longer than others.

Bronze powders will not stand exposure out of doors without tarnishing. A coat of varnish over a bronze paint will retard this tendency and make the bronze hold its color much longer. Aluminum bronze is quite permanent on exterior exposure. Gold leaf is used for outside work in place of the bronze powder paint.

Bronze powders are made in many very beautiful colors having the metallic sheen, such as Pale Gold, Rich Gold, Deep Gold, Copper, Lemon, Green Gold, Antique Green, Fire, Peacock Blue, Crimson, Carmine, Orange.

QUESTIONS ON LESSON 5

1. Name the four principal basic paint pigments.
2. What is the newest basic paint pigment developed?
3. Of what is white lead made? What are its characteristics? Has it been used for several years? Do painters mix dry white lead with oil to make paint?
4. Name the characteristics of zinc oxide. What raw material is used in making it? Is it as fine as white lead? —as white?
5. What is whiting? Is it manufactured from a metal? Name the various grades of Whiting. What is Titanium Pigment?
6. What is red lead? What is it used for? Does it dry readily? Does it fade in color? Is litharage the same as red lead?
7. What is graphite? What color is it? On what kind of surfaces is graphite used?
8. What are bronze powders? What colors are to be had? Where are bronzed powders used? Are they mixed with linseed oil?

LESSON 6

COLOR PIGMENTS

It has been shown in other sections that white lead and zinc to which linseed oil, turpentine and drier have been added make a white paint.

When a colored paint is wanted, it is but necessary to add to the white paint, color pigments called tinting colors such as red, green, blue, yellow or brown. When very dark colored paint is wanted, like black, dark brick red and very dark brown, for example, white lead or other white pigment is not used to any great extent. The

color pigment is used straight as it comes from the manufacturers, adding only the oil, turpentine and drier. Two or more of these basic tinting color pigments are often mixed together to produce certain other colors.

Tinting colors are manufactured in the form of dry pigments. Then they are mixed (ground) to paste form by adding linseed oil; water (called distemper color) for calcimine and for graining; in varnish, for enamel; in Japan, for carriage, automobile and sign painting.

Color pigments are divided into four classes according to their origin:

(1) **Mineral Color Pigments**: Such colors are for the most part dug out of the earth like coal. They are then washed, graded and floated off in a stream of water. The finer portions of pigment float off and are collected, the impurities and coarse color sinks to the bottom. After collecting the finer color pigment it is dried and ground exceedingly fine and is mixed with oil, water, turpentine, Japan or varnish ready for the painter.

The principal mineral colors are: yellow ochre, siennas (raw and burnt), umbers (raw and burnt), venetian red, red oxides, and metallic browns.

(2) **Chemical Color Pigments**: These are colors made by mixing different chemical solutions together. These solutions, when mixed, throw down a fine colored powder. Then the water is drawn off and the colored pigment is made dry by squeezing out the water and by heating. Chief among these colors are: chrome yellow (canary, medium and orange), chrome green and Prussian blue. There are other chemical colors derived from coal tar products, the dye stuffs as they are called. These very fine dye colors are precipitated upon inert white base pigments like barytes and sold as tinting colors.

(3) **Vegetable Color Pigments**: These are such as are made from decayed vegetation, like Vandyke brown, found in swamps. Brunswick black is also in this class, being made from charcoal obtained from burning twigs and vines. Then there are other vegetable colors used chiefly in making stains such as walnut hulls, oak tan bark. Many of the very transparent lake colors used in fine carriage and automobile painting are of vegetable origin.

(4) **Animal Color Pigments**: Perhaps the most conspicuous colors derived from the animal kingdom are carmine which is obtained from cochineal, an insect and bone black called ivory black, drop black and coach black. These blacks are made by burning animal bones

to charcoal and grinding the charcoal to a fine powder, after which it is mixed with linseed oil, turpentine, Japan or water.

Other Blacks: Carbon black and lamp black are made by burning gas or oil and collecting the soot deposited. They have very great tinting strength. Black oxide of iron is produced by precipitation.

A more useful, if not so interesting, way to divide color pigments for study is to group them according to colors as follows, naming the three primary colors of the sun spectrum first—reds, blues, yellows:

Oil Colors: Those commonly ground in linseed oil for house painting are:

REDS

Indian Red
Tuscan Red
Turkey Red
Venetian Red
Scarlet Vermilion
Unfading Vermilion
English Vermilion
Permanent Red

BLUES

Chinese Blue
Cobalt Blue
Prussian Blue
Ultramarine Blue

YELLOWS

Light or Canary Chrome Yellow
Medium Chrome Yellow
Orange Chrome Yellow
Dutch Pink
Golden Ochre
Yellow Ochre

BLACKS

Coach Black
English Blue Black
Ivory Drop Black
Lamp Black
Carbon Black
Black Iron Oxide

GREENS

Light Chrome Green
Medium Chrome Green
Bottle Green
Bronze Green
Forest Green, light, medium and dark
Emerald Green
Olive Green

BROWNS

Raw Sienna
Burnt Sienna
Raw Umber
Burnt Umber
Vandyke Brown
Brunswick Brown

Above colors are packed in 1 pound, 5 pound, 10 pound and 25 pound packages.

Dry Colors: Most of the above colors are to be had in dry powder form. Dry colors are not much used by the painter. They are needed for making colored putty to match wood work. Formerly great quantities of dry color were used when most painters mixed their own calcimine from whiting, dry colors, glue, and water.

Decorators' Colors: A finer grade of colors are ground in oil also, called decorators' colors. They are used on fine interior decorating work. Following are the most common colors of this class. They are put up in press-

top cans of one pound size, and also in tubes 1¼x6 inches long.

REDS

Decorators' Red
Indian Red
Permanent Red
Rose Pink
Turkey Red
Tuscan Red
Venetian Red
Am. Vermilion
Eng. Vermilion

BLUES

Antwerp Blue
Cobalt Blue
Prussian Blue
Ultramarine

YELLOWS

Chro. Yellow, Lemon
Chro. Yellow, Light
Chro. Yellow, Med.
Chro. Yellow, Orange
Dutch Pink
Golden Ochre
Yellow Ochre
Flake White

GREENS

Chrome Green, L.
Chrome Green, M.
Chrome Green, D.
Sap Green
Zinnobar Green
Ultramarino Green

BLACKS

Ivory Black
Lamp Black
Lettering Black

BROWNS

Burnt Sienna
Raw Sienna
Burnt Umber
Raw Umber
Van Dyke Brown

LAKES

Alizarin Lake
Blue Lake
Carmine Lake
Crimson Lake
Geranium Lake
Green Lake, Lgt.
Green Lake, Dk.
Mauve Lake
Olive Lake
Orange Lake
Rose Lake
Scarlet Lake
Yellow Lake

Glaze Colors: Still another class of colors are called "Fine Glaze Colors." They are ground in oil and are of the transparent variety—they do not hide the surface or color of under coats. Put up in cans and tubes:

YELLOW

Brown Pink
Gamboge
Italian Pink
Indian Yellow
Orange Lake
Yellow Lake, Light
Yellow Lake, Deep
Royal Golden Lake
Raw Sienna

GREEN

Alizarin Green, Light
Alizarin Green, Deep
Blue Green
Emerald Green
Green Lake, permanent
Malachite Green
Sap Green
Vert Emeraudo
Verdigris

BLUE

Cobalt Blue
Chinese Blue
Italian Blue
Steel Blue
Verditer Blue
Ultramarine Blue

PURPLE

Deep Purple, extra
Royal Purple
Heliotrope
Magenta

RED

Alizarin Crimson
Alizarin Lake
Carmine No. 40
Florentine Lake
French Nakaret Carmine
Geranium Lake, Bluish
Geranium Lake, yellowish
Permanent Crimson Lake
Permanent Turkey Red
Permanent Vermilion, Light
Permanent. Vermilion, Deep
Rose Madder
Scarlet Lake
Vienna Rose Lake
Asphaltum

Colors in Distemper, or water colors: Used for graining and for fresco decoration of walls. These colors are very fine and ground in water with a glue, or other size, for a binder. Packed in 5 and 10 pound cans, or glass jars.

BROWNS

Cologne Brown
Raw and Burnt Sienna
Raw and Burnt Umber
Vandyke Brown

BLACKS

Ivory Drop Black
Lamp Black

BLUES

Antwerp Blue
Azure Bluo
Chinese Blue
Cobalt Blue
Italian Blue
Paris Blue
Prussian Blue
Ultramarine Bluo

YELLOWS

Chromo Yellow, L., M. & D.
Dutch Pink
Golden Ochre
Ultramarine Yellow
Yellow Ochre

GREENS

Antwerp Green
Chrome Green, L. M. & D.
Emerald Green
Leaf Green
Lime Green
Malachite Green
Moss Green
Neuwieder Green
Olive Green

PURPLES

Ultramarine Violet

WHITES

Flake White
Zinc White

REDS

American Vermilion, L. & D.
English Vermilion, L. & D.
Indian Red
Rose Pink
Turkey Red, L. & D.
Tuscan Red
Venetian Red
Ultramarine Rose

LAKES

Carmine Maroon
French Maroon, Dark
Geranium Lake
Green Lake
Maroon Lake
Purple Lake
Rose Lake
Rose Madder

Colors Ground in Japan: These are colors mixed with a varnish for binder of a very light nature and a volatile thinner which evaporates, allowing the color to dry flat. Not often used by the house painter but sometimes urgently needed for store fronts to be varnished and for steam radiators in residences. Used principally for carriage and automobile painting. Put up in one pound and five pound cans in paste form and thinned by the painter with turpentine for use. A list of these colors follows:

REDS

Am. Vermilion, Pale
Am. Vermilion, Deep
Carriage Part Lake, Light
Cherry Red
Cinnibar Red
Insignia Red
Motor Car Red, Light
Motor Car Red, Medium
Motor Car Red, Deep
Parisian Red
Princess Louise Lake
Runabout Red, Light
Runabout Red, Deep
Saginaw Red, Light
Saginaw Red, Med.
Saginaw Red, Deep
Tuscan Red
Tuscania Red

WINES AND MAROONS

Rich Maroon
Deep Wine
Verdun Maroon
Victory Maroon
Marsellaise Maroon

GREENS

Alpine Green
Argonne Green
Apple Green,Deep
Brewster Green, Light
Brewster Green, Med.
Brewster Green, Deep
Car Body Green, Dbl. Lt.
C. P. Green, Light
C. P. Green, Medium
C. P. Green, D. D.
Emerald Green, Light
Flanders Green
Liberty Green
Milori Green, Light
Milori Green, Deep
Napier Green, Light
Olive Green, Medium
Phaeton Green
Roumanian Green
Sage Brush Green, Light

BLUES

Alsace Blue
Annapolis Blue
Azure Blue, Light
Blue Devil Blue
Car Body Blue, Light
Coach Blue, Light
Coach Blue, Deep
Coventry Blue
English Violet
Holland Blue
Insignia Blue
Packard Violet
Peacock Blue
Picadilly Blue
Prussian Blue
Rolls-Royce Blue
Suburban Blue, Dbl. Lt.
Suburban Blue, Light
Suburban Blue, Medium
Town Car Blue, Light
Town Car Blue, Medium
Town Car Blue, Deep
Ultramarine Blue
Versailles Blue
Violet Purple

BROWNS

Antwerp Brown
Beaver Brown
Biego Brown, Light
Biege Brown, Deep
Brussels Brown
French Brown
Golden Brown
Khaki Brown
Moleskin, Light
Moleskin, Deep
Mojave Brown
Olive Brown
Onondaga Brown
Packard Brown
Pigskin Brown, Light
Pigskin Brown, Deep
Sienna Raw, Light
Sienua Burnt, Light
Sienna Burnt, Deep
Umber. Raw
Umber, Burnt

YELLOWS

Cream Color, Light
Chrome Yellow, Light
Chrome Yellow, Med.
French Ivory
Italian Cream
Lemon Yellow, Pale
Old Ivory
Orange, Light
Orange, Medium
Orange, Double Deep
Permanent Yellow, Med.
Straw Color

BLACKS

C. P. Lamp Black
Coach Painters' Black
Drop Black
Eng. Coach Black
Eng. Drop Black
Ivory Jet Black

WHITES

Flake White
Zinc White in Demar

GRAYS

Artillery Gray
Battleship Gray
Dustproof Gray, Deep
Fawn Gray
French Gray, Light
French Gray, Medium
French Gray, Double Deep
Gun Metal Gray, Light
Gun Metal Gray, Deep

GROUND COLORS

Azure Blue
Light Blue
Light Red
Deep Red
Rich Red
Med. Vermilion
Deep Vermilion
Deep Maroon

Permanency of Colors: Some colors are more permanent than others when exposed to the weather and sunlight particularly. Generally speaking, earth pigments are more permanent in color than chemical colors, but the chemical colors: chrome green, chrome yellow and Prussian blue are sufficiently permanent for most purposes when used in their proper places. The commonly used house paint tinting colors can be classed this way:

PERMANENT

Raw Sienna
Burnt Sienna
Lamp Black
Carbon Black
Black Oxide of Iron
Indian Red
Raw Umber
Burnt Umber
Venetian Red
Chromium Oxide
Toluidine Red
Yellow Ochre
Tuscan Red
Ultramarine Blue
(except with white lead; use zinc)
Cobalt Blue

FAIRLY PERMANENT

Chrome Green, Light
Chrome Yellow, Light
Chrome Green, Medium
Chrome Yellow, Medium
Chrome Green, Dark
Chrome Yellow, Orange
Para Red

FUGITIVE

Prussian Blue
Red Lead
Aniline Reds
(except Toluidine)

QUESTIONS ON LESSON 6

1. What are the four classes of color pigments, considered from the standpoint of origin?
2. How are colors prepared for painters' use by manufacturers?
3. Name the principal mineral or earth colors.
4. Name the three chief chemical colors.
5. Name the two best known vegetable colors.
6. What is the chief animal color?
7. What difference is there between ordinary oil colors, Decorators' Colors, Dry Colors, Glaze Colors, Distemper Colors and colors in Japan?
8. Are all colors equally permanent in sunlight? Is chrome green permanent? Is raw umber permanent? Will American blue (Prussian) hold its color in the bright sunlight?

LESSON 7

PAINT OILS, VOLATILE THINNERS AND LIQUIDS

Linseed Oil: There are about ten drying and semi-drying oils which under special conditions are used by manufacturers as paint oils. But out of all this array only one—raw linseed oil—is available in sufficient quantity and of a reliable quality to be depended upon by the painter and decorator for exterior work. Linseed oil has the necessary drying power and ability to bind the paint pigment together and to the surface to which it is applied, making it practical oil for painters to use.

Only by using pure linseed oil can you reduce the chance of having such paint troubles as: failure to dry, soft and tacky paint, running sagging, wrinkling, collection of dust, flies and gnats.

Pure raw linseed oil is obtained by crushing flax seed (linseed) in large steel roller mills. After the oil is squeezed out, it is permitted to settle and age, to remove the "foots," which is the mucilaginous matter. The longer it settles the better. In these days, however, manufacturers are so anxious to keep down the expense of holding oil in stock that some of it is distributed after filtering while it is yet too young for use.

Years ago the oil was extracted cold, but now the hot-pressed process is quite generally used. Many painters believe the cold pressed oil made a paint with a higher gloss.

Much of the boiled linseed oil as used today has not actually been boiled on the fire, though some manufacturers do make true boiled oil. Some of the boiled oil of today is raw linseed oil to which has been added a certain amount of drier to hasten the drying. The various metallic salts like red lead, litharge, borate of manganese and others are used as driers for this purpose.

A long time ago painters used to actually boil raw linseed oil in large kettles, but it is rarely done now. Most painters use raw linseed oil, adding Japan drier, for outide work and boiled linseed oil for interior painting.

Considerable traffic in adulterated, or "dope" paint oil has been carried on for years. Many painters have come to grief and no little expense when they carelessly bought oil under some such fancy name as: "linseed oil compound", "improved linseed oil", etc. Many names are

used which have a "catch" in them to trap the unsuspecting painter. It is easy, however, to be sure of getting pure linseed oil by buying it only from manufacturers and dealers who are known to be reliable.

The laws in several states require that linseed oil containers be labelled—"Pure Linseed Oil." Such a label with the name of a reliable manufacturer attached is assurance that the product is pure linseed oil.

The substitutes for pure linseed oil as a rule contain some linseed oil, but also such non-drying or very slow drying oils as mineral oil, fish oil, corn oil, resin oil and resin varnish.

It does not pay the painter to use cheaper substitute oils. The cost of curing the resulting ills in labor alone is often as much as the profit on the job. No successful substitute for pure linseed oil is available in sufficient quantity to be of value to the painter. Linseed is the oil most easily secured by manufacturers in large quantities at a moderate cost; its action in paint is known and more uniform and satisfactory results can be secured by its use than from any other paint oil or combination of oils.

Turpentine: A volatile (evaporating), clear, white liquid used to reduce or thin paint and varnish. There are three different varieties. Gum turpentine is obtained from the sap and gum of the pine tree, this is distilled in a retort and the turpentine collected, and is the best variety of the three for painting purposes. The residue that remains in the retort is rosin. The second variety is wood turpentine, which is obtained by the distillation of pine waste wood such as stumps, sawdust, etc. When this distillation is done direct, common wood turpentine is obtained. If this distillation is done by steam a product is obtained which does not have the strong odor of wood turpentine, and very closely resembles gum turpentine. The chemical properties of all three varieties, gum, destructively distilled, and steam distilled, are identical and can all be used for the same purpose, except where the odor of the destructively distilled wood turpentine is objectionable.

Turpentine in paint performs at least three services: It helps to secure penetration of the paint into the pores of the wood, it promotes drying and it causes the paint to spread and brush out more freely, evenly and smoothly. Like linseed oil, the turpentine helps to distribute the paint pigment evenly over the surface.

But unlike linseed oil, which remains on the surface with the pigment and actually increases in weight by absorbing oxygen from the air, turpentine almost completely evaporates. Its effect on the paint is only temporary.

Turpentine Substitutes: Because the service performed by turpentine in the paint is largely mechanical, that is, to facilitate its application, substitutes have been used with some success.

Although benzine is used in a limited way as such a substitute, it is not satisfactory. Using benzine causes the paint to brush out "short", that is, it does not spread as easily. And when there is very little linseed oil in the paint, (where a flat finish is wanted) the benzine used in place of turpentine is not at all satisfactory. It causes the pigment to pile and rough up, causes brush marks, laps and joints to show. This is because the benzine evaporates too rapidly and leaves the paint film before its work is done. By using fractions of petroleum oil, which are slower in evaporation than benzine, and identical to turpentine in this respect, satisfactory results can be obtained. Such fractions of mineral oil are called "mineral spirits." Their use has increased greatly in recent years, especially when turpentine is very high priced and scarce.

The turpentine substitutes which have merit are high boiling point distillates of a mineral oil base. They are of a somewhat different character from benzine. They are known as mineral spirits and as such are widely used in prepared paint.

Benzine: A light, volatile white liquid refined from petroleum. It is used in large quantities by painters, principally for washing out brushes. Sometimes used instead of turpentine, being cheaper, in paint mixed from left-over paint, paint skins and scraps from paint pots. Such paint is used only on shingle roofs, rough fences and barns.

Alcohol: The alcohol mostly used by painters is the denatured form. It is grain alcohol to which the government requires the manufacturers to add certain substitutes which are poison. It is used largely for mixing and thinning shellac. Used also for cleaning up a varnished surface from which the old varnish has been removed by a liquid varnish remover.

Wood alcohol in itself is a paint and varnish solvent strong enough, often, to remove varnish. Wood alcohol is poisonous.

Benzole (90°): A volatile, thin liquid which evaporates very rapidly. It is distilled from coal tar. Its chief merit for painters' purposes is in its ability to penetrate and dissolve gums and resins of which varnishes are made. Used to a limited extent in the manufacture of some special liquid paints and largely in varnish removers.

Occasionally a painter is called upon to paint a pitch pine wood surface so full of sap gum that the paint cannot get an anchorage. The paint scales off. Under such circumstances a coat of benzole 160° called Solvent Naphtha brushed on a few seconds ahead of the paint coat will soften the gum enough to give the paint a "foothold". Another way is to add about a pint of this benzole to a gallon of paint just before spreading it on the surface.

Bronzing Liquid: A thin varnish made of oils, gums and volatile liquids. Used as a binder for bronze powders. Bronze paints are used mostly on radiators, pipes and machinery. Bronzing liquid is sometimes made by thinning down good interior varnish with turpentine. As a rule the quantity needed for each job is small and it is more convenient to purchase the liquid ready prepared in gallon cans or smaller.

Floor Oil: An oil used on maple floors to give them a uniform, waterproof appearance and to make them more easily cleaned. There are oils on the market ready prepared for this purpose—usually mineral oils. Painters also prepare their own floor oil by mixing about two thirds raw linseed oil and one third turpentine.

Liquid Drier: A liquid added to paint to hasten the drying. It consists largely of certain very active natural driers such as red lead, litharge, borate of manganese, lead acetate, and cobalt incorporated in linseed oil and thinned with turpentine.

When such a liquid drier contains a gum or resin it is called Japan drier.

Liquid driers hasten the setting and drying of paint by promoting the more rapid absorption of oxygen by the linseed oil.

These materials are purchased ready prepared from manufacturers.

Gloss Oil: This is really a thin varnish composed of rosin and a volatile thinner such as benzine. A cheap

varnish used as such for coating barrels or other temporary wood surfaces.

Gloss oil scratches and mars easily. It is not a satisfactory varnish for house decorating. It is used to some extent as a size on plaster walls to stop suction, but it would be far better if it were never used on any wall which is to be painted.

Polishing Oils: When interior wood trim or furniture are to be given a fine polished finish, a rubbing or polishing oil is needed.

After all coats of varnish are on and thoroughly dry, the polishing oil, usually a non-drying mineral oil (motor oil will do) is spread on the surface. A certain amount of fine pumice or rotten stone is mixed with the oil. The varnished surface is then rubbed with a felt pad or a short-bristled stub of a round pound brush.

Other Oils: China Wood Oil, Perilla Oil, Soya Bean Oil and similar oils are not usable in their raw form for the painter. These oils require kettle treatment and are, therefore, used only by paint manufacturers who have the equipment and knowledge of treatment.

Liquid Paint & Varnish Remover: A liquid solvent powerful enough to dissolve hard paint and varnish, to soften them long enough to permit scraping them off with a putty knife. Alcohol, acetone and benzole 90° are largely used with other materials in making these liquid removers. Benzole, being very volatile, if used alone will evaporate before it has time to cut the old hard varnish or paint; so a gum or wax is added in making the removers which retards evaporation of the benzole. Care should be taken to remove with benzine or other solvent any traces of wax or gum before the application of paint or varnish to the surface to be refinished.

QUESTIONS ON LESSON 7

1. What is the best paint oil? Why?
2. What other oils are just as good?
3. When is raw linseed oil used? Where is boiled linseed oil used?
4. What paint troubles does dope oil cause?
5. What function does linseed oil perform in paint?
6. Where does turpentine come from?
7. Does turpentine bind the paint pigment to the surface? Why is turpentine used?
8. What are mineral spirits?
9. What is the principal use made of benzine by the painter?

10. What form of alcohol is used by painters usually for painting purposes?
11. What is benzole (160° solvent naphtha)? Where used?
12. What liquid binder is mixed with bronze powders?
13. In mixing paint what is added to make it dry?
14. Describe liquid paint and varnish removers.

LESSON 8

PREPARED PAINTING MATERIALS

House Paints—Exterior: A large part of the paint used today on the outside of buildings is prepared in paint factories ready to be spread on by the painter. This ready mixed paint is complete, containing the necessary pigment, oil, turpentine, colors and drier. The complete mixture is sealed up in a can. A large number of colors can be purchased in this way.

Upon receiving a can of prepared paint the painter simply opens the can and with a paddle mixes the pigment, which has usually settled to the bottom, with the liquid on top. Then it is ready to spread with the brush. If the paint is fresh, or is of a kind the pigment of which remains in suspension a long time, this mixing can be done more rapidly than the same amount of paint can be mixed from white lead.

Undeniably good paint of this kind is being prepared by the paint factories. When just the right chemical balance is formed the ready mixed paint is neither too soft nor too hard. That is, it does not chalk off too rapidly, nor does it scale off. With correctly balanced prepared paint there are no injurious chemical reactions while the paint is sealed up in cans.

The principal ingredients of such paint are white lead, zinc oxide, linseed oil, and tinting colors. Such chemically inert pigments as barytes, asbestine and silica are often used in small amount. In the best grades of prepared house paints the lead and zinc pigments constitute about 85% of the total pigment.

In the making of prepared paints two vital considerations determine whether the paint is to be serviceable and satisfactory: First, the exact chemical knowledge, skill and experience with the many materials possessed by the manufacturer. Because these make him capable, or incapable, of mixing his paint to have just the right chemical balance; Second, the intention of the manufacturer. If his intent is really to make the most serviceable paint

possible, he will mix with his foundation materials, lead, zinc, linseed oil and turpentine, only such quantities of other and cheaper materials as will actually improve, reinforce and balance up his basic materials.

It is generally true that prepared paints for exterior work are valuable directly in accordance with the proportion of linseed oil, turpentine, white lead and zinc contained. The more of these basic materials they contain the more serviceable they are.

A measure of worth of paint for average conditions, then, is that:

1. It must cover 300 square feet or more of good surface with two coats, producing a uniform, evenly colored surface with no dark or thin places.
2. It must produce a paint film which is not so hard and brittle as to crack and scale off when the wood expands and contracts with temperature changes, nor so soft as to chalk off rapidly on exposure to the sun, nor wash off by the rain.
3. It must have an average life of three to five years of protection for the suface. And under favorable circumstances to wear much longer.
4. It must be durable in color, neither fading too rapidly in the sun, nor changing color—bleaching or discoloring—due to chemical reactions. The color of the paint under the dust and dirt accumulations to be the color judged.
5. It must leave the surface of the building in suitable condition for repainting, without the necessity for burning and scraping off of the old paint. Only dusting off and puttying should be needed.

The specifications for ready mixed paint shown in Circular No. 89 of the Bureau of Standards, Department of Commerce, of U. S. government, indicate this standard for such materials: "Ready-mixed paints shall be well ground, shall not settle badly or cake in the container, shall be readily broken up with a paddle to a smooth, uniform paint of good brushing consistency, and shall dry within 18 hours to a full oil gloss, without streaking, running or sagging. The color and hiding power when specified shall equal those of a sample mutually agreed upon by buyer and seller. The weight per gallon shall be not less than 15¾ pounds."

PIGMENT.—The pigment shall be composed of:

	Maximum Per cent	Minimum Per cent
White lead (basic carbonate, basic sulphate, or a mixture thereof)..........	70	45
Zinc oxide (ZnO).....................	55	30
Silica, magnesium silicate, aluminum silicate, barium sulphate, pure tinting colors, or any mixture thereof........	15	0

In no case shall the sum of the basic lead carbonate, basic lead sulphate, and zinc oxide be less than 85 per cent. The lead and zinc pigments may be introduced in the form of any mixture preferred of basic carbonate white lead, basic sulphate white lead, zinc oxide, or leaded zinc, provided the above requirements as to composition are met.

Flat Wall Paint: A paint prepared complete by manufacturers. It includes all necessary ingredients, the pigment, color, oil, volatile thinner and drier. The painter has but to open the can and mix the contents thoroughly with a paddle.

In the case of the better grades of flat wall paints this mixing is easily and quickly done, but in some of these preparations the pigment separates from the liquid, settles in the bottom of the can and gets quite hard. It is then necessary to break up this pigment with a putty knife before it will be taken up again by the liquid in the mixing. Warming the paint can in hot water helps to make it mix easier.

Although it has been only a few years since flat wall paint appeared, it has gained a wide market, being used now extensively on plaster walls of residences and business office buildings. It has taken the place to a large extent of much calcimine, cold water paints and white lead formerly used on such walls.

Flat wall paint characteristics are—that it dries without lustre, is nearly a dead flat except for the slight sheen noticeable in certain light reflections; it flows out freely from the brush like varnish, levels itself up and eliminates brush marks, laps and points when correctly brushed. It sets quickly and some brands rough-up if you go back to a skipped place a minute or two later to smooth it up. Other brands set more slowly, and are generally satisfactory. The exact method for brushing this material is given in Lesson 19.

The better grades of flat wall paint hide the surface completely sometimes in one coat but usually two coats are needed to give a beautiful finish. Most of the flat wall paints can be washed successfully.

The pigment of flat wall paints is usually composed of lithopone and zinc-oxide in combination with other pigments. The liquid portion is usually an oil which dries flat. China wood oil (tung oil) is the principal liquid used, although other varnish compounds which dry without gloss and become water-proof are used also. These paints are made in many beautiful light and fairly dark colors.

Here is the United States Government specification for a high grade ready-mixed lithopone flat wall paint. Paints under these specifications are not intended for outside exposure; they must dry to dead flat, opaque coats that will adhere to wood, metal and plaster, stand washing with soap and water, and show no material change in color on exposure to light.

PIGMENT.—The pigment shall consist of:

	Maximum	Minimum
	Per cent	Per cent
Lithopone	....	80
Zinc oxide	10	....
Tinting and extending pigments	10	....
Material soluble in water	0.8	....

Note.—The Lithopone used must contain not less than 26 per cent of zinc sulphide and must not darken on exposure.

(b) LIQUID.—The liquid portion of the paint shall consist of treated drying oils or varnish, or a mixture thereof, and turpentine or volatile mineral spirits, or a mixture thereof, in such proportions as to insure not less than 25 per cent of nonvolatile vehicle. The nonvolatile vehicle shall dry to a tough and elastic film.

(c) PAINT.—The paint shall be well ground, shall not settle badly, cake, or thicken in the container, shall be readily broken up with a paddle to a smooth, uniform paint of brushing consistency, and shall dry within 18 hours to a dead flat finish without streaking, running, or sagging and free from laps and brush marks. The color and hiding power when specified shall be equal to those of a sample mutually agreed upon by buyer and seller. After drying for not less than five days, marks made on the painted surface with a soft lead pencil (No. 2 Mogul) shall be easily removed by washing with soap and warm water without appreciably marring the paint surface. The weight per gallon shall be not less than 14½ pounds.

The paint shall consist of:

	Maximum	Minimum
	Per cent	Per cent
Pigment	72	68
Liquid (containing at least 25 per cent non-volatile matter	32	28
Water	1	....
Coarse particles and "skins" (total residue retained on No. 200 screen based on pigment).	0.5	....

Flatting Oils: These are oil compounds which are added to white lead by painters when they wish to mix flat wall paints themselves.

This oil, white lead, zinc and tinting colors makes serviceable flat wall paint. Tinting colors ground in oil are added to the white paint to produce any tint or shade wanted.

Flat wall paint mixed in this way is washable and brushes out well, a dull, beautiful lustre. The painter can mix any color needed to harmonize with the room furnishings. And of course it can be mixed in as small or large quantities as may be needed for the job.

Floor Paints: These are paints prepared complete by manufacturers, containing pigments and liquids combined to make an especially tough paint. Probably no painting or decorating materials are called upon to withstand such hard service as floor paints and varnishes. The grinding wear of heels, the continual scrubbing and scraping of furniture constitute most difficult service for paint to withstand.

In composition, floor paints are mixed from lithopone, zinc and lead pigments ground in hard drying varnish. When the painter mixes floor paint using white lead, zinc, turpentine and colors, floor varnish or a product called floor paint hardener is used as a binder instead of linseed oil. Litharge is often added to the pigment in proportion of one to seven.

More about floor painting will be presented in Lesson 37 on working methods.

Stock Whites: These are prepared paints made upon many different formulae. One of the better kinds is made by mixing together 45 lbs. white lead, 45 lbs. zinc oxide, 10 lbs. silica or other inert pigment; about 3¼ gallons of oil

liquids are added and then the 100 lbs. of pigments plus the 25 lbs. of oil and thinners make about 8 gallons of paint. This paint is about 60% pigment and 40% liquids and is of the correct brushing consistency for third coat work.

Stock whites at one time referred to batches of white lead and linseed oil mixed up in tubs in the larger shops It was simply a means taken to save time; the lead was broken up and partly thinned when the men were not busy. Then when the few gallons of paint were needed in a hurry, the paste was smooth and ready to be tinted and finally thinned. So the name—stock white—is very indefinite and may mean most any kind of paint.

Mineral White Primers: Sometimes composed principally of whiting. But what has been said above about Stock Whites applies equally to mineral white primers

French Gray Ochre: A fancy name for the same class of paints as above mentioned Stock Whites. The same facts also apply.

White Stone Ochre: May be anything anyone wants to sell as paint. Same description as for Stock White.

White Primer: See description for Stock White. Same facts apply.

Prince's Mineral: A reddish brown natural earth pigment, an oxide of iron. It is ground in linseed oil to paste form. Thinned by the painter with linseed oil, turpentine and drier. Used on rough work such as fences, roofs and barns. A durable pigment as to color and wearing quality, also used largely for tin roofs and other metal.

Calcimine: A wall coating mixed for years by the painter using bolted whiting as the principal pigment, colors in dry powder form and water and glue as the liquid binder. Used to decorate plaster, cement, stone and brick walls. In nearly all cases the surface is covered satisfactorily with one coat. In exceptional cases two coats are put on when one does not cover.

Most of the calcimine used today is that prepared by manufacturers and which contains the glue, or casein binder. It is a dry powder shipped in barrels or packages. Nothing is added except water to make it ready for use. Most calcimines can be washed off easily with water, but some of those which have a casein binder instead of glue are difficult to remove.

Prepared calcimines, of which there are several brands on the market, come in several light and dark colors.

They are used to color and to decorate plaster walls. See Chapter 6.

Cold Water Paints: These are in the same group with calcimines and whitewash. Several inert white pigments are used as well as whiting and the binder may be glue, casein or some other water soluble adhesive material. There are several brands of prepared cold water paints on the market.

Mill Whites: These are entirely different from calcimine and cold water paints as described above. Mill Whites are usually composed of lithopone and zinc oxide ground in high grade treated oils. They are waterproof and they have remarkable light reflecting properties Made to dry with a full gloss, semi-gloss or flat finish. They are washable. Used on factory interiors and other industrial buildings as well as on schools.

Wall Sizes: There are several materials of this nature prepared ready for use by the manufacturers. Their compositions vary greatly. A wall-size is a thin liquid which is brushed on to a plaster or stucco wall to seal up the pores and stop suction. Used also on wall-board, canvas, muslin and burlap covered walls.

There are three general classes of wall-size: glue size, varnish size, and oil size. Most of the wall-size used is mixed by the painter himself. Glue size is made by adding a small amount of glue to water. Varnish size is varnish thinned down to about the consistency of milk with benzine or turpentine and to which a little of the paint to be used is added. Its use is not recommended.

Mixing methods for wall-size is described in Lesson 18.

Putty: Several kinds of putty are used. The two kinds which are prepared for painters ready to use by manufacturers are called ordinary commercial putty and lead putty.

The cheaper grades of commercial putty usually are not fit to use as they do not remain long where you put them. They are made of several cheap pigments,—chalk being one of the favorites,—mixed with fish oil or mineral oil. On the other hand, many manufacturers make a high grade commercial putty using whiting and pure linseed oil. Such products give excellent service. It is most important that the oil binder be linseed.

Lead putty is made of white lead and whiting thinned with linseed oil.

Except for large jobs, painters usually make their own putty by taking a bit of white lead paste (that ground in oil) and adding to it equal parts of dry white lead and dry whiting (either one or both). It is mixed in the hand by kneading with the fingers when only a little is wanted. Larger quantities are made in the painters' shop by grinding first through a paint mill and then pounding on a marble slab with a mallet until thoroughly mixed, and of just the right stiffness. All large painting contractors buy putty ready made. Dry colors are added to color the putty to match the paint or wood.

Wood Fillers: These are thick, transparent paste pigments which are spread on the open grained wood, such as oak, ash, chestnut, walnut and mahogany, to fill up the pores of the wood before varnishing. Fillers are used to fill the grain of the wood, to stop suction and make a level, non-absorbent surface for the varnish. They are brushed on to a floor, for instance, allowed to set a few minutes and then are wiped off, leaving only the filler which remains in and fills the pores of the wood to dry hard.

There are paste wood-fillers for open grained wood like oak and chestnut, and liquid fillers for close-grained wood like gum, maple, birch, and pine. Shellac is also an excellent filler which is much used on birch and maple, always in thin coatings. It is spread on, allowed to dry and then all is sandpapered off except that which remains in the pores of the wood.

Painters mix paste wood-fillers by adding linseed oil and turpentine (some prefer benzine) and drier to silex (silica), a very hard, transparent sand or crushed rock. Paste fillers are prepared by manufacturers in much the same way, although other ingredients are often added, and materials are finely ground by machine. They are principally a fine mineral pigment mixed with a special varnish. Prepared wood fillers come in a can in the form of a thick paste. This is thinned down to a heavy paint consistency by adding turpentine. Fillers may be colorless or colored with oil colors to stain the wood grain figure and make it show up decoratively.

The working method for handling fillers will be given in Lesson 34.

Crack Fillers: These are compounds prepared by manufacturers for use in filling cracks between boards of floors before painting, staining or varnishing. Their compositions vary greatly. The requirements are that a

thick paste be made which will spread easily under the putty knife, hold fast where it is put, smooth off nicely and not shrink when it becomes dry. It must dry hard in a few hours at the most. Painters mix these fillers also in several ways. Formulae and mixing methods will be presented in Lesson 36.

Iron Fillers: These are pastes or semi-pastes which are used principally to fill up holes in metal castings and on metal machines before painting. Various kinds are made for this purpose, prepared by manufacturers ready for use.

Paint Cleaners: Several prepared materials are offered by manufacturers for cleaning dust, dirt, grease and stains off of interior painted walls. Some are excellent and make it possible to wash walls absolutely clean and spotless, even when that cannot be done with ordinary soap and water. As a rule these are powder or liquid substances to be added to the washing water according to the manufacturers' directions.

Most walls can be washed clean by simply using mild soap and warm water. See Lesson 17. A little starch is sometimes added to the water and it is brushed on with a calcimine brush. Then the surface is sponged off with clear water. Soap made of pure linseed oil is used for this purpose, too.

Gold Paint: A mixture of bronze powder and a liquid binder. Essentially the same as such paint mixed by the painter using dry bronze powder and bronzing liquid, except that it comes in a sealed can mixed and ready for use after stirring it.

Cement Paint: These are prepared paints often of quite different composition than ordinary house paints. Some painters prefer them for painting concrete and stucco, others prefer ordinary white lead and zinc paint.

When such surfaces are to be painted with lead and oil or prepared mixed paints of the ordinary kind, special treatment of the surface is advisable, unless the surface has been weathered for several years.

Such treatment is this: Brush on to wall a solution made by dissolving 3 pounds zinc sulphate crystals to each gallon of water. Let dry thoroughly; then paint.

QUESTIONS ON LESSON 8

1. What is ready mixed paint? Where is it used?
2. How do you mix prepared paints to make them ready for the brush?

3. What are the principal ingredients of high class prepared paints?
4. Are all brands of ready mixed paint alike? Is one as good as another, service considered?
5. What is the measure of work for determining the value of any paint?
6. Is the same kind of paint used on interior and exterior walls?
7. What are Flat Wall Paints? Their characteristics?
8. What is Flatting Oil?
9. Are Floor Paints any tougher than others? Why?
10. What are Stock Whites?
11. How is calcimine made? What kind of surface is it used on? Is more than one coat put on? Can it be wiped with a wet cloth to clean it?
12. How are cold water paints different from calcimine?
13. Describe mill white. What is its composition? Where is mill white used?
14. What are wall sizes? What kinds are there?
15. Of what materials is the best putty made?
16. The purpose of wood fillers is what?
17. Where are crack fillers needed?
18. How is gold paint made?
19. Can you paint on cement surfaces?
20. What treatment is necessary on new cement?

LESSON 9

VARNISHES, JAPANS, LACQUERS, ENAMELS

Varnishes are those thick liquids which produce a hard-drying, gloss (or flat) coating, a coating which is usually transparent, but not always so.

Varnishes are made from such basic materials as vegetable oils, fossil gum resins (those dug from the earth), other contemporaneous gum resins (those gathered from trees and insects), volatile liquids and essences, volatile mineral oils, certain hydro-carbon compounds, metallic salts and to a minor extent animal oils and waxes.

The gums which constitute the basic material for most varnishes are rather numerous. They are called fossil gums because they are dug from the earth, being gums from trees of former ages. Gums from all parts of the world are used, the principal classes are: Kauri gum, from New Zealand; gum animi, from Africa (this includes Zanzibar, Madagascar and DeMerara gums); the Benguela and Angola copal gums; Accra Copal; South American and West Indian Copals, Manila Copal; Pontianak, from Borneo; New Caledonia, from New Caledonia; and Congo gum, from Congo.

Then there are certain other gum resins used which come mostly from trees such as:—pine, known to most

of us as rosin; Venice turpentine, which is similar; Dammar resin, the sap gum from a tree; Sierra Leone gum; Manila gums; Bush gum, from the living kauri tree; Camphor gum; gum mastic; gum sandarach; Dragon's blood, a red gum; gum elemi and shellac gum produced by an insect on East Indian trees.

Broadly speaking, varnishes are classified as: oil varnishes, spirit varnishes and Japans. In addition to painters' varnishes many kinds are made for special purposes in manufacturing plants. They are used not only on the merchandise made but on machinery and equipment in use by the factories.

The manner in which varnish dries is interesting. The volatile thinners evaporate; the drying oils oxydize (absorb oxygen from the air and form a solid). As these two separate actions are performed the gums or resins, being solids dissolved by the liquids, return to the solid state, uniting with the drying oil solids.

The Oil Varnishes: These are varnishes which are made from gum resins, a fixed oil (usually a vegetable oil like tung or china wood oil or linseed oil), a small amount of metallic salts like red lead, litharge, borate of manganese, used to assist the drying and enough of a volatile liquid like turpentine and benzine to thin the composition to brushing consistency.

The Spirit Varnishes: These are such varnishes as are made by dissolving gum resins in volatile liquids. Perhaps the best known of spirit varnishes is shellac, consisting of gum shellac dissolved in alcohol. Spirit varnishes set and dry very quickly. From one to three coats of shellac can be brushed on in a day and each coat will become dry enough to sandpaper, while most other varnishes require many hours to dry, but are far more durable.

Japans: A name which has caused more or less confusion in many minds because it means more than one material. House painters' Japan, and Japan drier, mean a liquid drier consisting of metallic salts like red lead, litharge, borate of manganese, also a small amount of gum, all dissolved in a drying oil. Then a little volatile thinner liquid like mineral spirit or turpentine is used by the manufacturers to thin it to about the consistency of linseed oil in order to make it easy to mix with the Linseed Oil, or the Paint. It is used only to mix with paint to hasten the drying.

There are liquid driers made which contain no gum resins. They are called oil driers or liquid driers (not Japans). About the only practical difference in the actions of the two kinds of drier is that Japan drier, because of the gum contained, has a tendency to add to the lustre of the paint if too much is used, while the oil driers do not. That is not desirable in the case of the paint mixed by the painter to dry flat. Liquid or oil driers do not increase the lustre of flat paints and sometimes will decrease the gloss of gloss paints if large proportions are used, and will also burn the paint and retard the drying.

Then there is a class of varnishes known as Japans. These are dark brown or black varnishes made on an asphaltum base. They are used largely on sheet metal household articles, tinware, hardware and machine parts. They are made as "air-drying Japans" (black asphaltum) and Baking Japans."

Enamels: To distinguish between varnish, Japans, enamels and paints is sometimes difficult. They merge into each other, often, according to composition. And then, varnish is so broad a word in meaning it might be said that any combination of materials containing heat treated oils or gum resins is a varnish. But in everyday work varnish usually means a transparent material. Enamel usually refers to those materials whose liquid content is mostly varnish but which have an opaque pigment and sometimes a color pigment in their make-up. Enamel hides the surface fairly well. True enamels are fused to metallic surfaces by intense heat. The use of the term in paints is somewhat of a misnomer.

Paint may for certain purposes contain some varnish, floor paint for example. If one were too literal-minded it might be said that such paint is enamel. But as the proportion of varnish is small in comparison with the oil, the material really is paint.

The enamels mostly used are prepared by manufacturers ready to be applied by brushing, after the material has been thoroughly stirred. As a rule they are made in white. The quantity of different colored enamels being used is very small.

Enamel Undercoating: Enamel can be made to dry with a high gloss, or with a semi-flat or satin finish, or with a flat finish having no lustre. The latter is prepared by the manufacturer to use as an undercoat for

the finishing enamel, it dries nearly flat, covers well, and flows out freely, being free from brush marks. When dry can be sandpapered, presenting a smooth finish for the finishing coat. Some painters prefer flat white lead paint made with paste white lead and turpentine for enamel under coats.

Spar Varnish: This takes its name from the original purpose for which it was made, namely: to protect masts and spars of ships from the ill effects of moisture and salt air.

The name spar varnish is now used to indicate all long-oil varnishes which are tough, elastic and resistent to moisture. Spar varnishes are made for both interior and exterior use today as well as for marine uses. A good spar varnish is so elastic that it will protect surfaces which expand and contract greatly from temperature changes. It is used on exterior surfaces which are subjected to the weather such as outside doors, porch ceilings and store fronts. Spar is a tough and durable varnish.

Coach Varnish: At one time this name was given only to varnishes used on carriages, coaches and railway cars for fine finishing results. The name "coach" now means also an interior architectural varnish which dries with a high gloss.

Damar Varnish: Those made from Damar gum are so called. They were used more by painters years ago than now. Sign painters use them much as a size. The whiteness of Damar varnish is its chief virtue. It is quite colorless. Other gums which are nearly as white and which have other virtues not possessed by Damar are being used in place of it today. And other gums are mixed with it, too. Damar is used for making enamels and lacquers.

Shellac: A varnish made by dissolving shellac gum in alcohol. Classed as "grain alcohol shellac" and "wood alcohol shellac."

The natural shellac color is an orange yellow and is called orange shellac. White shellac is the orange shellac which has been bleached.

Denatured alcohol has replaced grain alcohol almost entirely for use with shellac.

The characteristics of shellac are its quick drying, the ease and rapidity with which it can be sandpapered. It can be sandpapered in an hour after application when

thin coats are used; indeed, it is often sandpapered and second coated within the hour. It is rather a temporary finish, because the coating is brittle in one sense, and yet it seems to be fairly tough for a while. At any rate, it does not wear long on most surfaces.

Shellac does not produce a high gloss, but rather a semi-gloss. It is easily damaged by water which turns it white permanently. It scratches and mars easily. It is used principally by the house painter on hard maple floors and to some extent on interior trim woodwork.

Hard-Oil Finish: Various materials are sold under this name as a varnish. At one time years ago hardwood interior trim was finished by rubbing it with linseed oil. This method of finishing is not followed today, because the oiled wood collects dust. What is called hard-oil finished wood today is usually yellow pine that is coated with varnish.

There are so many materials bearing this name of hard-oil today that a definition cannot be given. Both good and poor grade varnishes are sold under this name, some being excellent. They can usually be distinguished by their price, character, and the reputation of the manufacturer. Some of these materials are cheap varnishes,—gloss oil usually which is rosin and benzine. They are used on cheap furniture and for coating barrels. And on the other hand, some manufacturers make high grade varnishes and call them hard oil finish. They give good results.

Asphaltum Varnish: This is called air-drying Japan or Black Asphaltum made largely of asphaltum. Asphaltum is made from petroleum, also from Gilsonite. A very dark brown or black varnish used mostly by manufacturers for finishing tinware and hardware.

Painters use asphaltum varnish occasionally for finishing gas pipe railings on stairways of factory buildings. It is used, too, as a wood stain by thinning it with benzine for producing a mission or a weathered oak finish. Asphaltum varnish is useful sometimes to seal up water stains, smoke stains and "bleeding" aniline reds which come through coats of paint and enamel on wood trim.

Cabinet Finishing Varnish: An interior varnish made suitable for furniture. Fairly light in color, it dries hard without any tendency to get "tacky," sticky, during damp weather. It can be rubbed and sandpapered freely for fine finishing and dries with a high gloss.

Interior Finishing Varnish: These are such as are especially suitable for the interior wood trim of a house. They are used for the same interior purposes as Interior Coach and Interior Spar Varnishes. They dry in twelve to twenty-four hours and sandpaper without gumming. They do not get sticky during damp weather and they dry with a good gloss. They do not prove serviceable on exterior work. They are lighter in color than exterior varnishes like spar. Interior spars are not made to be as durable outside as exterior spar varnish.

Floor Varnish: These are such as have the special qualities needed to make them wear well under extremely hard service. Floor varnish must be tough to withstand the grinding wear of heels, the scraping of furniture, the washing with damp cloths. Yet it cannot be too hard or it will scratch too easily. It must dry over night to be dust free and hard enough to permit moderate use; it must dry in forty-eight hours. It must, in a word, possess all of the interior service giving durable qualities of spar varnish, and yet the convenience of home life requires that it dry in a short time, as much of the floor varnish used is for revarnishing old floors. The production of the excellent floor varnishes we have today is surely a great credit to manufacturing skill and intelligence. Floor varnishes are very elastic and dry with a high gloss; they resist shocks and do not easily scratch.

The serviceability of floor varnishes is tested by simply brushing a coat or two on sheets of glass or tin. Note the speed of setting and the time required to dry dust free and really hard. Their resistance to moisture without turning white, resistance to rupture, abrasion, scratches, etc. can best be made by testing the varnishes poured on tin.

Varnishes other than floor varnishes do not as a rule give satisfactory service on floors. In fact, this is quite true of most conditions requiring varnish. Each varnish is made to fit its purpose and is able to withstand the conditions of such service. So it is important that you see that the varnish you use is intended to be used for the purpose in mind by the manufacturer.

Rubbing Varnish: This is a quick-drying, hard-setting varnish used mostly by the carriage and automobile painter. It dries hard enough in about twelve hours to withstand rubbing with pumice stone and water. The house painter rarely has occasion to use rubbing varnish.

Most other varnishes, however, can be rubbed and sandpapered after they become hard dry. The rubbing of course is to smooth them up, to remove dirt nibs and make a fine surface for following coats of finishing varnish. The varnish must not be affected by oil, water or the heat from rubbing.

Polishing Varnish: A hard-drying, finishing varnish like that used to finish pianos, fine furniture and wood trim of interiors. It dries with a high gloss and is rubbed to a high polish, using a rubbing oil and rotten stone. Most cabinet rubbing varnishes are satisfactory polishing varnishes.

Finishing Varnish: As indicated by its name this is any varnish used for the final coat on any work. It dries hard and with a high gloss or flat finish according to kind.

Color Varnish: Used mostly by automobile and carriage painters. It is rubbing varnish to which a small amount of color has been added. Used to impart a deep lustre and color effect. Some color varnishes are really good quality flowing varnish to which transparent colors are added. When opaque colors are added to varnish the material is then really an enamel.

Flowing Varnish: This is a varnish made to produce a smooth, high gloss finish without rubbing or polishing.

Flat Varnishes: These are such as are made to dry without a gloss, to produce a dull "mat" finish which is without lustre. By the use of a Flat Varnish a finish very similar to that which is obtained by rubbing a varnish can be obtained without the work of rubbing. Also very useful on carvings and other parts which are difficult and almost impossible to rub, on which a dull finish is desired.

Mixing Varnish: The flat mixing varnish is a special product made for manufacturers who add suitable pigments and colors for making of flat wall paints and other prepared paint specialties.

There is a class of varnishes used to some extent by painters and known as white mixing varnishes. They are used for making enamels by adding zinc, white lead and the mixing varnish together.

All Purpose Varnish: Such varnishes have appeared on the market in recent years. They are used as general utility products, being designed for use on both exterior and interior surfaces. Practically all varnish used by the United States Government is of this type.

Other Varnishes: There are other varnishes made for special work which do not concern the painter except as a matter of interest. Special products are made for furniture, machinery, marine use and for merchandise.

Lacquers: These are thin, very transparent spirit varnishes used on metals and other materials to impart a lustre and prevent the surfaces from tarnishing. They protect the surface from gases and vapors. Highly polished brass is given a coat of lacquer to prevent it from becoming dull. These are usually made of nitro-cellulose (celluloid) dissolved in amylacetate (banana oil).

QUESTIONS ON LESSON 9

1. What is Varnish?
2. Varnishes are made from what basic materials?
3. Name two or three commonly used varnish gums.
4. What are oil varnishes? Spirit varnishes? Japans?
5. How does enamel differ from varnish? From paint?
6. Describe Spar Varnish, Coach Varnish, Damar Varnish, Cabinet Varnish, Floor Varnish, Rubbing Varnish, Interior Finishing Varnish, Shellac, Asphaltum Varnish.

LESSON 10

STAINS AND MISCELLANEOUS MATERIALS

The materials referred to here are those stains and dyes which are used to color the grain of interior wood trim and furniture without covering or hiding it. They are transparent, of course.

Spirit Stains: These are such as are mixed with alcohol, benzine and turpentine. They are also made with other volatile thinners. They are called penetrating stains. The coloring materials used to produce these and other stains are of great variety. The chief coloring now used are those derived from coal tar—the anilines. They are very strong. Some are quite permanent and non-fading while others are not. Anilines as a rule are fugitive; moreover, they invariably cause the succeeding coats of varnish to "bloom."

Oil Stains: These are such as are produced by mixing the tinting colors used for tinting paints, such as the umbers, siennas and others with linseed oil, turpentine and drier. Only a small amount of tinting colors are used. What is wanted is a transparent, thin colored liquid which will color the surface but not hide it.

Water Stains: These are such as are made of transparent colors which are soluable in water. They were extensively used years ago and are still the best for certain kinds of staining.

Shingle Stains: These are made in different ways, but mostly as oil or spirit stains. Creosote oil is also added to many as a preservative. The most common mixture is to thin colors ground in oil with creosote and drier. Of the prepared stains ready to use a dip coat and a brush coat are needed. For method see Lesson 13, Chapter 4.

Varnish Stains: As the name indicates these are combinations of coloring materials and varnish designed to stain and finish a surface in one coat. Toys and furniture are often finished in this manner. The difference between varnish stain and enamel is largely that the stain does not hide the wood grain, being transparent, while the enamel does because it is opaque. The enamel also has a larger amount of pigment than varnish stains.

Most of the stains used today are those prepared ready for use by manufacturers. They are delivered to the painter in one gallon cans and smaller; also in barrels for large jobs like shingle roofs. It is entirely practical for painters to mix certain stains for some woods economically. Formulae and mixing directions for these will be covered in Lessons 32 and 33.

Floor Wax: A material which is substantially the same as shoe polish for tan shoes. Made largely of bees wax and paraffin wax, although other waxes enter into the composition to some extent. These are thick pastes which are brushed on to varnished floors and polished with a weighted brush.

Oxalic Acid: A bleaching acid which comes in white crystal form. It is dissolved in water and put on to oak floors after old varnish and dirt stains have been removed. The oxalic acid bleaches the wood and gives the floor a uniform appearance before new varnish coats are put on. It is poisonous and should be handled carefully.

Plaster of Paris: Gypsum which has been calcined by drawing off the water of crystalization is very fine, and when mixed with water sets quickly into a hard mass. Used to fill cracks in old plaster walls before redecorating.

Glue: A gelatine used in the form of flakes and in a ground form like sand. The greatest quantity is used in the form of a size for walls to be calcimined.

Pumice Stone: A fine volcanic stone material which comes in several grades of fineness. A gray white powder used with water or oil to rub varnish and paint coats down to a smooth surface.

Rotten Stone: A white powder finer than pumice stone and used as the final rubbing material in oil or water for fine varnish polishing jobs like piano cases.

Sand Paper: Heavy manila paper to which sharp sand or glass powder is glued. As you probably know it is used to smooth down rough lumber, paint and varnish. It is made in various degrees of fineness. No. 00 is the finest. Then the grades get coarser from No. 0 to No. ½, to No. 1, then No. 1, 1½, 2, 2½ and 3.

Steel Wool: A material used in place of sand paper. It is made of shreds of steel of various fineness and is graded the same as sand paper. No. 00 steel wool being made to do the work of pumice stone; No. 0 cuts like No. 0 sand paper; No. 1 equals No. 1 sandpaper; No. 3 equals No. 1½ and No. 2 sand paper; Nos. 4, 5, 6 are coarser grades for removing paint and varnish.

Curled Hair: This is horse hair mostly and is used for a light rub on varnish and enamel to reduce the gloss and remove any dust on the surface.

QUESTIONS ON LESSON 10

1. Name the five classes of stains.
2. Do oil, water or spirit stains fill the pores of the wood? Does varnish stain?
3. What is floor wax?
4. Oxalic acid is used for what purpose?
5. Plaster of Paris is used for what?
6. What kind of glue is used for glue size?
7. Pumice stone is used for what purpose?
8. Name the different grades of fineness of sandpaper, of steel wool.

CHAPTER 4

LESSON 11

MIXING THE PAINT

Now that acquaintance has been made with tools and materials, it should be interesting to make use of them.

For a simple illustration in painting let us paint a board—one about eight inches wide and four feet long, or perhaps a flower box, a dog house or a chicken coop, if available for painting. The first step is to provide the paint ready for spreading.

Prepared Paint: If prepared paint is at hand to be used, cut the top of the can open with your putty knife. Then stir the paint to mix it thoroughly, breaking up all the lumps of pigment. A clean, flat wood paddle is best for this purpose of mixing. Have an empty paint pail handy and pour the paint from one pot to the other several times during the mixing.

When the pigment portion of a prepared paint has settled to the bottom of the can, the correct way to again mix the settled pigment with the liquid is to first pour off all liquid into another pot; stir up the pigment paste thoroughly and then add a little of the liquid at a time. Stir each lot of liquid into the pigment completely before adding more. Then when all of the liquid has been added the paint will be smooth and will brush out well.

Breaking-Up White Lead Paint: When it is desired that the paint be mixed by the painter the best method for white paint follows. For mixing colored paints, simply add to these directions tinting colors ground in oil.

The first step is to prepare your white lead which comes in paste form, rather thick, in kegs containing 12½ lbs., 25 lbs., 50 lbs., 100 lbs., 300 lb. casks and 500 lb. casks. This paste has in it 8% pure linseed oil and 92% white lead. It is necessary to thin it down with more oil.

An empty 100 lb. white lead keg is greatly used for mixing when only a gallon or two of paint are wanted. With larger quantities to be mixed wood barrels are used—the 300 lb. white lead casks are just the right size, usually—often larger wood barrels are cut into two parts through the middle are used.

Put into the mixing keg the amount of white lead

paste to be used. Start breaking up this lead by adding a **very small quantity of oil**—not more than one pint of oil to 100 lbs. of lead. With a good, strong, smooth paddle, work the oil completely into the lead; then add another pint of oil and when this is thoroughly worked in, you may add more oil a quart at a time, working it thoroughly into the lead each time, until you have worked in about one and one-half gallons of oil to 100 lbs. of lead. In breaking up smaller quantities of lead, you will, of course, reduce the amount of oil proportionately.

The batch of paint will now readily thin down with more oil into a perfectly smooth paint, entirely free from lumps.

The working qualities of paint are very much improved by straining and by letting it stand at least over night before using,—longer if convenient.

The method given above for mixing is not only labor saving, but it is the only way by which a high grade white lead can be properly broken up; adding a large amount of oil at first instead of a little at a time will cause the lead to break up lumpy, that is, small pieces of the lead paste will swim about in the thinned paint and dodge the paddle for a long while, wasting your time.

Lead-Zinc Paint: In preparing a mixed lead-zinc paint the zinc paste and the lead paste should be broken down separately. Follow the scheme outlined above for breaking-up white lead for each pigment, with the exception that a small quantity of refined linseed oil (about 10% of all the breaking down oil) should be used in breaking down the zinc paste. A portion of the drier for the completed paint should also be added to the zinc with the last lot of raw oil. When the two pastes have been broken down almost to painting consistency and strained, their boxing (pouring from one pot to another several times) and final thinning should be done and the mixed paint brought down to the final painting consistency required, after being well mixed and stirred thoroughly.

The average painter, when he desires to mix a paint containing definite proportions of zinc oxide and white lead, fails to take into consideration the necessary variation in the quantities of each, occasioned by the different percentages of oil in which the pastes are ordinarily ground.

Based upon the average of 15% of oil used in grinding

zinc oxide paste and 8% in grinding white lead paste, the following table has been prepared to show the approximate quantities of each pigment in oil necessary to produce 100 pounds of mixed paste, the dry pigment of which will analyze as indicated in the first column:

Proportions desired				Use Zinc Oxide in Oil	Use White Lead in Oil
20.0%	Zinc	........80.0%	Lead	21 lbs.	78 lbs.
22.5	”	........77.5	”	23 ”	76 ”
25.0	”	........75.0	”	26 ”	73 ”
27.5	”	........72.5	”	29 ”	70 ”
30.0	”	........70.0	”	31 ”	68 ”
32.5	”	........67.5	”	34 ”	65 ”
35.0	”	........65.0	”	36 ”	63 ”
37.5	”	........62.5	”	39 ”	60 ”
40.0	”	........60.0	”	41 ”	58 ”
42.5	”	........57.5	”	44 ”	55 ”
45.0	”	........55.0	”	47 ”	53 ”
47.5	”	........52.5	”	49 ”	50 ”
50.0	”	........50.0	”	52 ”	48 ”
52.5	”	........47.5	”	54 ”	45 ”
55.0	”	........45.0	”	57 ”	43 ”
57.5	”	........42.5	”	59 ”	40 ”
60.0	”	........40.0	”	61 ”	38 ”
62.5	”	........37.5	”	64 ”	35 ”
65.0	”	........35.0	”	66 ”	33 ”
67.5	”	........32.5	”	69 ”	30 ”
70.0	”	........30.0	”	71 ”	28 ”
72.5	”	........27.5	”	75 ”	25 ”
75.0	”	........25.0	”	76 ”	23 ”
77.5	”	........22.5	”	78 ”	21 ”
80.0	”	........20.0	”	81 ”	18 ”

Straining Paint: This may be done by using a piece of wire fly screen but not so well as by tying a double thickness of cheese cloth over the top of a clean, empty pail. Use a piece of twine, as shown by illustration—Figure 55—to make the cloth fast to the pot. Then pour the paint through the screen after mixing it well. Stir the paint around in the cloth pocket with the brush until all except hard lumps and skins have passed through. Then remove the cloth, put the skins into the barrel which every paint shop keeps to receive them. They are worked up into paint for rough surfaces when enough have been accumulated. Special paint strainers are made as shown by Figures 49 and 50, Lesson 4.

Fig. 55

Two great benefits come from straining your paint.

First, it is made clean by removing skins and coarse substances. Second, the pigment is completely incorporated with the oil—each particle of pigment is surrounded and coated with oil by this straining and mixing. This thorough mixing makes it much easier to spread the paint to an even thickness on all of the surface. Also it causes the paint to spread more easily under the brush.

Other Information About Mixing: How to know when enough oil has been added is something you must learn from experience. The mixing quantities to follow are approximately correct, but some variation must be expected. In measuring your quantities figure by weight rather than by liquid measure. A gallon of linseed oil weighs approximately 7¾ lbs. In testing the mix it is best to judge it by spreading it with a brush onto a wood surface. It may appear by the feel of the paddle to be too thick and yet be just right. It may feel just right but be too thin to cover properly.

When mixing lead paint for dead flat effects, follow the above method using turpentine instead of linseed oil. But first, mix the lead with benzine or turpentine and allow the paint to stand over night. In the morning skim off the oil which rises to the top, pouring off the benzine too, with the oil. Then when you have drawn off this part of the 8% of linseed oil which all white lead paste contains, mix it with fresh turpentine and it is ready for spreading and will dry absolutely without any gloss. This is necessary for enamel under coats and other interior work, but never for exterior painting.

When tinting colors are to be added they should be partly thinned with turpentine or linseed oil before they are added to the white paint. Add the color slowly before the paint is strained. Be very careful to add too little, rather than too much, as the straining breaks up the color and makes it stain the white paint a deeper color after the straining. If your paint is too light to match the sample you are mixing to, after the straining, add more color, but be sure the color has been thinned to brushing consistency and also strained before it is poured into the white batch.

Japan drier should be added to the white paste before it has been finally thinned to brushing consistency.

As to correct proportions of lead, linseed oil, turpentine and drier, it is quite out of the question to specify accurately for mixing paint, which will be suited to every

job. The kind of wood, condition of the old paint, the exposure, the weather and so many other things must be taken into consideration that it is as impossible to give one formula which will fit every surface as to make a pair of shoes which will fit every man.

Lumber which absorbs oil readily, such as bass wood, white pine and poplar, must be given sufficient oil to satisfy it, especially in the priming coat,—that means mixing this coat thinner. It is sometimes difficult to make paint stick to certain kinds of yellow pine which are full of pitch. Trouble of this kind can be avoided by using very little oil in the priming coat, because such wood does not absorb much oil. Details of this method are to be found in Lesson 13.

The specifications of materials to follow indicate raw linseed oil except for certain purposes. This is done because good boiled linseed oil, kettle-boiled, is often hard to get. It is easier, also, for the unscrupulous to cover up adulteration in boiled oil than in raw oil. In certain weather conditions boiled oil has a tendency to dry quickly on the outside and remain sticky for a long time underneath. That permits paint to sag and wrinkle Raw linseed oil dries more evenly throughout.

During the winter and when the weather is damp, the quantity of drier specified is not sufficient,—add 1/4 to 1/2 pint more for each 100 lbs. of lead when needed That time may be in July during "dog days", as we call the damp, humid weather, just as frequently as during the cold season.

Additional turpentine and Japan drier are also required to take care of such slow drying pigments as lamp black, chrome yellow, chrome green, yellow ochre, vandyke brown, raw and burnt umber.

You may expect to find some little variation in the thinning qualities of linseed oil made by different manufacturers and of seed from various localities and foreign countries. So to get the mixture of paint thinned to just the right point you must depend upon a brushing test. The paint must be thin enough to brush out freely, yet not too thin to hide the surface well. Another point, more oil will be taken up by white lead which has been slightly broken up a day or so in advance of using. It is much better to mix the paint ahead of time for this reason and because it works more freely.

MIXING FORMULAS

NEW OUTSIDE WOODWORK
For White Paint

First Coat

100 lbs. pure white lead.
4 gal. pure raw linseed oil.
2 gal. pure turpentine.
1 pt. Japan drier.
Makes about 9 gal. of paint.

Second Coat

100 lbs. pure white lead.
1½ gal. pure raw linseed oil.
1½ gal. pure turpentine.
1 pt. Japan drier.
Makes about 6 gal. of paint.

Third Coat

100 lbs. white lead.
3½ to 4½ gal. pure raw linseed oil.
1 pt. pure turpentine.
1 pt. Japan drier.
Makes 6½ to 7½ gal. of paint.
Many master painters add from 10% to 25% oxide of zinc to the above formula under certain circumstances and in some localities.

NEW INSIDE WOODWORK
For White Paint

First Coat

100 lbs. pure white lead.
3 gal. pure linseed oil.
4 gal. pure turpentine.
1½ pts. Japan drier.
Makes about 10 gal. of paint.

Second Coat

100 lbs. pure white lead.
1½ gal. pure raw linseed oil.
1½ gal. pure turpentine.
1 pt. Japan drier.
Makes about 6 gal. of paint.

Third Coat

Same as Second Coat for Old Inside Wood Work.

OLD INSIDE WOOD WORK
For White Paint

First Coat

100 lbs. pure white lead.
1 gal. pure raw linseed oil.
2 gal. pure turpentine.
1 pt. Japan drier (if raw oil).
Makes about 6 gal. of paint.

Second Coat—Oil Gloss

100 lbs. pure white lead.
3 to 3½ gal. pure linseed oil.
1 pt. pure turpentine.
1 pt. Japan drier (if raw oil).
Makes 6 to 6½ gal. of paint.

Second Coat—Semi-Flat

100 lbs. pure white lead.
1½ to 2 gal. pure turpentine.
¾ gal. linseed oil.
½ pt. Japan drier.
Makes 5 to 5½ gal. of paint.

Second Coat—Flat

100 lbs. pure white lead.
2½ gal. pure turpentine.
½ pt. Japan drier.
Makes about 5½ gal. of paint.

WHITE PAINT FOR DARK ROOMS

Linseed oil used in white paint spread away from sunlight or strong daylight, may turn the paint yellow. So to mix white paint or light tints which will not turn yellow in darkened rooms, use no linseed oil except in the under coats.

For a semi-flat finish mix the third coat for new work (also the second coat on old work) this way:

100 lbs. pure white lead.
1½ to 2 gal. pure turpentine.
¾ gal. white mixing varnish or white enamel varnish.
½ pt. Japan drier.

If more gloss is wanted in the last coat use less turpentine and more varnish.

OLD OUTSIDE WOODWORK

For White Paint

First Coat

100 lbs. pure white lead.
2 gal. pure raw linseed oil.
2 gal. pure turpentine.
1 pt. Japan drier.
Makes about 7 gal. of paint.

Second Coat

100 lbs. pure white lead.
3 gal. pure raw linseed oil.
½ gal. pure turpentine.
1 pt. Japan drier.
Makes about 6½ gal. of paint.

Third Coat

100 lbs. white lead.
3½ to 4½ gal. pure raw linseed oil.
1 pt. pure turpentine.
1 pt. Japan drier.
Makes 6½ to 7½ gal. of paint. (If only two coats are to be put on, omit the second coat.)

Third Coat—Full Gloss

3 lbs. pure white lead broken up smooth with turpentine.
1 gal. white enamel varnish.

Third Coat—Flat Finish

100 lbs. pure white lead from which the oil has been drawn as described previously.
3 gal. pure turpentine.
Makes 5¾ gal. of paint.

EXTERIOR METAL WORK

First Coat

100 lbs. pure red lead (ground in linseed oil like white lead).
1½ gal. pure raw linseed oil.
¾ gal. boiled linseed oil.

or

100 lbs. pure dry red lead.
2¼ gal. pure raw linseed oil.
1⅛ gal. pure boiled linseed oil.

Second and Third Coats

Mix as above but add about a pound of paste lamp black and ½ pint Japan drier. This to tone down the bright color of the red lead. The last coat on metal is sometimes mixed from white lead the same as for old outside wood work and tinted any color to suit.

Iron work to be painted must be cleaned first of all scale, dirt and grease. From tin roofs the grease should be carefully scraped and the seams wiped clean with benzine or turpentine to remove grease. If very greasy it ought to be washed with warm water and washing powder or sal soda. Wash and dry it before painting, of course.

New galvanized iron should be washed with a solution of 6 oz. copper acetate in 1 gal. of water or with a mixture composed of one quart of warm water, ½ oz. each of nitrate of copper, chloride of copper and salammoniac have been dissolved and to which ½ oz. of crude hydroclorie acid has been added. Mix this in a glass or earthen jar. Apply this wash with an old flat brush; when dry a powder remains which should be brushed off. Then the metal is black and ready to paint. This treatment roughs-up the metal so that the paint will usually anchor itself. It usually avoids the scaling of paint so commonly noticed on galvanized iron. A more certain way is to allow the galvanized iron to weather for 6 months or longer.

BRICK, STUCCO, CONCRETE SURFACES

First Coat

100 lbs. white lead.
7 gal. pure boiled linseed oil.
1 gal. turpentine.

Second Coat

100 lbs. white lead.
2½ gal. pure raw linseed oil.
1½ gal. pure boiled linseed oil.
1 pint turpentine.

Third Coat

Same as for new outside woodwork. Flat and semi-flat finishes same as for old inside wood work. When concrete is less than a year old, if free lime or alkali are noticed on the surface, it should first be washed with a solution of 3 lbs. of sulphate of zinc crystals in 1 gal. of water to neutralize the causticity.

How Much Surface Will a Gallon Of Paint Cover? That cannot be answered in so many words. It depends upon several elements. An expert brush hand will cover 25% more surface than one not so experienced, with the same kind of paint; and his job will look as well. The thinner the paint film is spread, of course, the more surface it will cover. And when three coats are to be given it is well to brush the paint out thin. The important point on all work is to brush the paint out only as far as it will go and still hide the surface well. Light paint over a dark colored surface must be spread thicker than over white or other light tints. Dark colored paint will hide a surface better, obviously, than white or very light tints and it will naturally be brushed out thinner as a matter of habit. So more surface will be covered by dark colors as a rule than by white and light colors.

A rough surface will require more paint to cover it than a smooth one. Lumber which is soft and porous will absorb more oil and require more paint than a hard, close grained wood.

Different brands of strictly pure white lead will vary in hiding power; due sometimes to varying proportions of carbonate and hydrate and sometimes to the fineness of the lead pigment.

A gallon of white lead white paint will cover from 300 to 500 square feet, two coats, depending upon the surface to be painted. On hard, smooth new wood which has been primed, the paint will cover 500 square feet, two coats. On old work which is dry and will absorb considerable oil, a gallon may not cover more than 300 square feet, two coats.

The amount of surface which will be covered by the first coat of white paint on new wood, depends upon the character of the lumber,—whether porous or hard and well filled with sap. This coat is mixed quite thin to have sufficient oil to satisfy the wood suction. Only enough pigment is provided to afford a foundation for succeeding coats. When only two coats are to be put on (which is a mistake for new work) the first coat must be made thicker. The covering capacity of a gallon of white paint for the priming coat will be found to be about 500 to 700 square feet, one coat only.

When tinting colors are added to produce colored paint the amount of surface which a gallon of paint will cover increases as the colors are made darker.

Red lead paint mixed for metal surfaces will cover, on smooth plain surfaces, about 1800 square feet per gallon, first coat; 1200 square feet per gallon, second and third coats. On ordinary structural steel a gallon will cover from 600 to 800 square feet, first coat; and 500 to 700 square feet for other coats. Thirty-three pounds of dry red lead and one gallon of linseed oil makes about 1.22 gal. of paint.

How Many Gallons from a Mix? 100 lbs. of white lead in paste form bulks about 2.85 gallons. Hence, 2.85 gallons added to the number of gallons of linseed oil, turpentine and drier mixed with the lead tells you how many gallons of paint produced from the batch mixed. The tinting color and drier added do not amount to enough in quantity and bulk, when light colors are mixed, to consider in these figures as a rule. In darker colors the tinting color added is enough in quantity to materially add to the number of gallons of paint produced.

TABLE OF AVERAGE BULKING VALUES FOR 100 POUNDS OF PASTE COLORS

Color	Percentage of pigment in paste	Percentage of oil in paste	Bulking values in gallons
Venetian Red (40% Fe_2O_3)..	78	22	5.9
Indian Red...............	78	22	4.7
Ochre.....................	70	30	6.8
Raw Sienna..............	55	45	7.8
Burnt Sienna.............	55	45	7.5
Raw Umber...............	54	46	8.3
Burnt Umber.............	54	46	7.6
Metallic Brown...........	75	25	5.9
Pure Para Red............	30	70	11.3
Ultramarine Blue..........	65	35	7.8
Prussian Blue.............	43	57	10.1
Carbon Black.............	20	80	11.6
Drop Black................	50	50	8.7
C. P. Green (average)......	77	23	5.0
C. P. Yellow (average).....	80	20	4.2
20% Green (Barytes Base)...	88	12	3.9
20% Yellow (Barytes Base)..	85	15	4.1
10% Para Red (Lime and Barytes Base)............	82	18	6.0
Red Lead..................	94	6	2.13
Lithopone.................	80	20	4.8
Basic Sulfate White Lead	91	9	2.86
Basic Carbonate White Lead.	92	8	2.85
Zinc Oxide................	82	18	4.05
Titanium Pigment BXX.....	80	20	4.6

Brushing the Paint: In Lesson 3 the correct way to hold the brush was described. It is important that you learn this method.

Preparing to brush the paint onto the surface, dip the brush into the paint only about two inches deep. Have the mixing paddle handy; hold it over the pot and scrape the paint out of the brush over it. Dip the brush and wipe it out several times in this manner so the paint will be thoroughly worked into the bristles. It is **never** necessary to dip the brush deep into the paint. The paint should not cover the bristles up to the metal ferrule. When it does, there is too much paint in the brush and that causes it to spatter paint about, to let the paint run down over the handle and drip, especially when brushing overhead on ceilings. A leaking brush wastes a lot of time. It also has a tendency to spread the paint too thick in places.

After the paint has been worked into the brush as noted above, dip it finally only about one inch deep into the paint, tap the brush against the side of the pot, below the edge, thus keeping the paint on the inside of pot until used.

Now let the brush come in contact with the board by two or three quick, light strokes in the middle of the board toward one end. This is simply to transfer much of the paint in the brush to the surface immediately, thus reducing the chance of spattering the paint about.

Next begin to spread the paint about to hide the surface and at the same time to make a paint film of even thickness on the whole surface. Cultivate a free and easy stroke, using the wrist movement, and do not "ride" the brush, that is, do not bear down hard, forcing the base of the bristles in contact with the surface. That wears out both the brush and yourself needlessly. Use both sides of the brush and aim to keep an even pressure on the surface with the brush all the time.

When brushing near the end of the board, it is necessary to brush only one way with the grain of the wood,—outward from the center of the board. If the back stroke is used the edge of the board will scrape off too much paint from the brush, leaving a "fatty" edge or a "run" of paint.

Having the complete surface covered, the final step is to "lay it off," as the painters say, meaning to go over

the whole surface covered with very light, swift strokes to smooth up all brush marks, laps and joints, also to cover any thin places called "skips" and "holidays."

QUESTIONS ON LESSON 11

1. Describe the method for mixing prepared paints.
2. How and why do you strain paint? Does straining benefit the paint any in addition to cleaning it?
3. Describo the correct mixing method for making white lead paint ready for the brush.
4. What size kegs of white lead are sold?
5. How much linseed oil is in 100 lbs. of white lead paste? How much white lead?
6. How much does a gallon of linseed oil weigh?
7. When and how do you add tinting colors to white paint?
8. When should Japan drier be added to your lead paint?
9. Is more Japan drier needed in winter? Is more needed by some colors than by others?
10. Will a gallon of paint always cover the same amount of surface? Will a gallon of white paint cover and hide as many squaro feet of surface as a gallon of black paint?
11. Does a gallon of red lead paint cover as much surface on metal as the same amount of white lead paint does on wood?
12. How many gallons in 100 lbs. of white lead paste? In 100 lbs. of Venetian red, in 100 lbs. of Zinc oxide?
13. How should you work your brush into the paint before using it?
14. Should the brush be dipped deep into the paint?
15. Should paint be brushed on with tho grain, or across the grain of lumber?

LESSON 12

COLOR MIXING

In Lesson 11 was described the mixing of white paint This same white paint is the base for light and medium dark colored paint.

What is necessary in mixing colored paint, after preparing the white paint, is to mix the required tinting color (a thick color paste ground in oil) in a small pot with enough linseed oil or turpentine to bring it to a fairly thin paste which will pour. This mixing or thinning must be thoroughly done and then the color must be strained the same as was specified in Lesson 11 for white paint. If this mixing and straining are not properly done, lumps of color will float around in the paint. Then dark streaks of color will show up under the brush on the surface painted.

When the color has been thinned in this manner, pour it into the white paint a **very little at a time.** Stir each

lot of color thoroughly into the paint to make sure its full tinting strength is exerted. There is great possibility that your paint will be too dark in color, if the amount of color added is not carefully noted and each lot added thoroughly mixed in.

After each little splash of tinting color is added to the white paint and after thoroughly stirring with the mixing paddle, test the mix for color by dipping in a brush and spreading the paint on a board. Take the painted board to daylight to note its color. Artificial light makes colors appear differently than daylight.

Color always looks a bit darker in the pot than when spread on a board. Some colored paints you mix will look different when spread on a white painted or colored surface than when brushed on to a natural colored new wood.

When you are mixing a batch of paint to match a sample color card, cloth drapes, wall paper or any other material, remember to clear your eyes of color occasionally during the matching; look away from the color, go look out of a window a few seconds at a time. When you look at one color too long the eyes seem to lose their sensitiveness to color and fail to distinguish between close tints of the same color, unless you rest them by looking at other colors as suggested. A very close match of colors is prevented, sometimes, because of failure of the mixer to remember this fact. The eye easily becomes saturated with and tired of one color; that color seems to change or fade to the mixer, but not to others.

Another interesting fact about the human eye. To maintain its balance and consequent accuracy in distinguishing colors, the eye must be able to see all three primary colors—red, blue and yellow. That is the reason for the statement often made that a truly harmonious color scheme always must have all three primary colors (red, blue, yellow) in it in some proportion. Of course, one of the three colors may predominate and the other two be present in a very small area. This does not mean, of course, that the pure strong red, blue and yellow must appear. Any of the delicate tints and shades of each accomplish the purpose.

If the color card or other material you are mixing paint to match has a flat finish,—is without gloss,—you cannot match it exactly with a gloss paint, though you can come pretty near to it. To exactly match a flat color

you must mix a flat color and judge the matching when your new paint is **dry.** Flats change a little in color in the drying. It helps during the matching to cover the flat color card with water; this permits you to approximate its color when it was wet.

A rough surface on a color sample you are called upon to match is confusing, too; a surface like a rough tapestry brick, for example. The high points cast shadows which seem to change the color of the surface in places. Take such a surface into direct sunshine to eliminate the shadows while mixing.

Another problem. Sometime someone will ask you to mix paint to match a color sample which is mottled, which has several colors appearing in it. That is much like the joke told on the chameleon, the little lizard famous for changing its color to that of the surface it is put on to,—a means of protection afforded by nature which makes him very difficult to see. The joker put him on a piece of Scotch plaid of many colors to note what would happen. The chameleon called the bluff. He could not turn red, green, yellow, and blue to match the plaid colors, so he just turned a neutral drab color which reduced his visibility materially.

You can not match this sample of many colors any more than the chameleon could, but you can mix a color which will match the general color tone of the sample, or mix a neutral gray using white and a little of each of the other colors seen in the sample; or if one of the colors seems to be more noticeable than others, is stronger or in greater area, just mix your paint to match that color and it will harmonize with the whole color tone, probably.

What Tinting Colors to Use: Now the natural questions coming to mind are, "What colors should I use to mix a brown paint, a green paint, a red paint, blue or tan?" "How can I know when to use one color or another?"

The answers come readily from nature's laws, and of course experience helps greatly. When a beam of sunlight passes through a prism it shows the primary colors,—blue, yellow and red. A rainbow also shows them, delicately shading off one into the other.

When you add one of these three to a white you mix a lighter tint of the same color. One of these primary colors mixed with a little black makes a darker shade of the same color. If you mix all three of the primary

colors together, red, blue and yellow the result is a neutral drab gray.

When you mix red and blue, the resulting color is—purple;

When you mix red and yellow, the resulting color is,—orange;

When you mix blue and yellow, the resulting color is,—green.

So purple, orange and green are the secondary colors. They are also called the complementary colors.

Each complementary color is the perfect contrast in color harmony for the third primary color **not** used in mixing it. Here is the way it works out: Red and blue make purple; yellow is not used in this combination, so purple is the perfect color contrast for yellow; red and yellow make orange; blue is not used in this mixture, so orange is the perfect contrast for blue; blue and yellow make green; red is not used in this mixture, so green is the perfect contrast of red.

Color harmony is produced in two ways commonly: (1) by using colors together which contrast perfectly together, like purple and yellow, orange and blue, green and red; (2) by using colors together which harmonize by analogy; that is, similar colors—two tones of the same color, or two colors which are related in their composition like green and yellow, for example: Yellow is one of the colors used to make green.

The whole matter of color schemes is intensely technical and quite difficult. As experience grows, however, color understanding comes naturally.

It is well to remember for interior decorating especially, that the most pleasing of color schemes often require the presence of all three primary colors,—red, blue and yellow, but in different proportions, different strengths and areas. Usually one of the colors predominates in area. The third color may and often is stronger and brighter than the other two but is in very small area. The bright color in that event is called a jewel point; just a dash of bright color to liven up the scheme.

It is important to remember that the primary colors referred to,—red, blue and yellow, are pure, strong colors of exactly the right character. When they are not strong or are of an incorrect character the mixing of two of them together may yield quite a different color than the complementary secondary color expected. If you

attempt to mix a purple by using a dull red, like a Venetian red, for example, and a blue which is not pure and strong,—one which has been extended to the limit of its tinting strength with off color pigments, the resulting color is not a clear purple; it is just a dull, drab mud color. To mix a clear purple a strong, bright red like vermillion added to Prussian blue which has not been extended too much will succeed. A dull blue and a dull yellow will not make the bright green you expect. A bright, clear blue and a strong yellow will do so.

There are great differences in the tinting strength of various brands of tinting colors and between the colors of one brand. Prussian blue is very strong in tinting strength; chrome yellow is much stronger than raw sienna and yellow ochre, other yellows; vermillion is far stronger than Venetian red, Van Dyke brown is stronger than burnt umber. But this refers only to the ability of these colors to tint or color white paint. The umbers and siennas are the most permanent of non-fading colors.

Mixing Black Paint: No white base is used. For ordinary black paint to dry with a gloss, lamp black ground in linseed oil to paste form is mixed with linseed oil, turpentine and Japan drier. Mix by the same method as was described in Lesson 11 for white paint.

Lamp black is a slow drying pigment, so more turpentine and less oil are needed,—about one-third to one-half turpentine depending upon the weather and surface conditions. More drier is needed than with other pigments.

For flat black paint thin the lamp black entirely with turpentine, using very little or no oil, but use also the Japan drier. When a fine flat black is wanted as for carriage and automobile painting, for store fronts to be varnished, for black boards in schools and for front doors, outside, which are to be varnished, then lamp black is not so suitable. Use ivory or drop black, sometimes called carriage black. It is ground in Japan, not linseed oil. Thin it with turpentine only in mixing the paint.

Mixing Gray Paint. When you mix black and white a gray results. When the pigments are lamp black and white lead the gray is crude and uninteresting. But add a little raw sienna or chrome yellow to this gray and it warms up delightfully and is much better to look at.

Interesting and useful grays are made by adding to black and white, vermilion, Prussian blue or yellow;—

just a touch of each is needed, not enough to be identified as such, but the change is beneficial just the same.

Mixing Brown Paint: A dark brown such as Color Card No. 1 is the solid burnt umber tinting color without other pigments. Thin this thick paste with linseed oil, turpentine and Japan drier by the same method as was described in Lesson 11 for mixing white paint.

A rather expensive dark brown, mixed this way, to be sure. A good dark brown can be mixed by adding about 25 lbs. of burnt umber, 10 lbs. burnt sienna and an ounce or two of medium chrome yellow to 100 lbs. of white lead.

Raw umber mixed with white yields browns, grays and drabs much like those produced by burnt umber.

Tan colors are mixed in several ways, in fact, this is true of many colors. An expert mixer can match given colors by different mixing formulæ. Color Card No. 2 shows a tan mixed with 1 lb. of burnt umber to 40 lbs. of white lead. A bit of chrome yellow and vermilion would make a more interesting color if added to these.

Mixing Yellow Paint: Medium chrome yellow solid, shown by Color Card No. 3, makes the brightest yellow paint, when mixed with linseed oil, turpentine and Japan drier.

Color Card No. 4 shows a light yellow resulting from the mixture of 1 lb. of medium chrome yellow with 20 lbs. of white lead.

Color Card No. 5 shows the same tinting color mixed, 1 lb. of yellow to 60 lbs. of white.

Raw sienna, Color Card No. 6, when mixed solid makes this rather interesting yellow. Added to white it yields more interesting yellows, tints which are most durable, but not quite so bright as chrome yellow tints.

Color Card No. 7 is mixed with 1 lb. of raw sienna to 10 lbs. of white.

Color Card No. 8 is mixed with 1 lb. of raw sienna to 60 lbs. of white.

Yellow ochre is another yellow shown as a solid tinting color by Color Card No. 9. Mix 1 lb. of ochre with 10 lbs. of white and the color on Card No. 10 results.

All of these colors are mixed the same as white paint with linseed oil, turpentine and Japan drier, as described in Lesson 11.

Mixing Red Paint: A fairly bright red paint, and probably the most permanent in color, is mixed by add-

ing 4 to 5 gallons of linseed oil, about 1 pint of turpentine and 1 pint of Japan drier to 100 lbs. of Venetian red,—the color shown by Color Card No. 11. Light red and pinks are mixed by tinting white lead with this Venetian red. Color Card No. 12 is mixed with 1 lb. of Venetian red and 10 lbs. of white. Color Card No. 13 is mixed with 1 lb. of Venetian red and 60 lbs. of white.

Burnt sienna, Color Card No. 14, when mixed with linseed oil, turpentine and drier makes a dark red paint which is decidedly permanent as to color. Color Card No. 15 is mixed with 1 lb. of burnt sienna and 10 lbs. of white. Color Card No. 16 is 1 lb. of burnt sienna and 60 lbs. of white.

Tuscan red and Indian red and orange chrome yellow are other reds which, when mixed with white lead, yield reds and pinks of slightly different character.

Bright reds are vermilion and what are called para red, perma-red, unfading vermilion and permanent red anilines. These are mixed with linseed oil, turpentine and drier as are other paints. It is advisable to mix lighter reds and pinks when vermilion is used by adding it to zinc oxide rather than white lead. There is a detrimental chemical reaction when vermilion and white lead are mixed, which changes the color.

Mixing Blue Paint: Prussian blue, Color Card No. 17. This chemical color is extremely strong for tinting purposes and it is difficult to avoid adding too much when mixing light blues. It fades when used in sunlight, but is satisfactory for interior use and for tinting white paint. It is too valuable a color to be dispensed with. Mix with linseed oil, turpentine and considerable Japan drier, just as white paint is mixed.

Color Card No. 18, shows the color produced by adding 1 lb. of Prussian blue to 10 lbs. of white. Color Card No. 19 shows what 1 lb. of Prussian blue and 160 lbs. of white yield in color.

Two other blues,—ultramarine and cobalt yield more interesting light tints when mixed with oxide of zinc white. These blues ought not to be mixed with white lead. The sulphur in their make-up changes white lead, which is a carbonate, to lead sulphide, which is black. The change does not affect the durability of the paint, only the color. It is safe to mix Prussian blue with white lead.

Mixing Green Paint: Medium chrome green, Color

Card No. 20, is a strong tinting color. Not a non-fading color in sunlight, but like Prussian blue, it is the most satisfactory color of its kind. There is nothing more permanent in green color known. Not as unfading in color as such earth pigments as the umbers and siennas, but satisfactory when judiciously used. A fairly slow drying pigment requiring more Japan drier than others. Mix with linseed oil, turpentine and drier in same manner as white paint.

A dark green not so bright in color but not so fugitive in sunlight can be mixed using raw sienna, medium chrome green and a bit of chrome yellow.

Other greens are light and dark chrome green, twilight green, bronze green, bottle and emerald green, each with a slightly different character of color tone.

Less Expensive Dark Colors: It should be remembered that the solid tinting colors: Color Cards No. 1 burnt umber, No. 2 medium chrome yellow, No. 6 raw sienna, No. 9 yellow ochre, No. 11 Venetian red, No. 14 burnt sienna, No. 17 Prussian blue, and No. 20 medium chrome green, are necessarily strong in tinting ability and are often expensive to use for mixing a considerable quantity of paint in dark colors like these. If but a small quantity of a dark color is needed, mix it as suggested, using these tinting colors solid. But when several gallons are needed, it is cheaper as a rule to secure a prepared ready mixed paint of the desired color.

Manufacturers are able to mix such dark colored paints cheaper than can the painter. Light colored paint pigments are brought up to the desired color by using very strong chemically pure tinting colors. It is clear that when the regular painters' tinting colors are used in large amount for mixing dark paint much tinting strength is wasted needlessly.

Mixing More Interesting Colors: Up to this point we have considered mixing colors only by adding one basic tinting color,—red, yellow, blue, green, brown or black to a white.

Much of the mixing done is accomplished that way, but often the light colors so produced are rather crude and raw to the sight of folks whose color sense is advanced in development. Far more interesting light colors result from adding to the white two or more of the basic tinting colors. For example, a light brown can be mixed by adding burnt umber to white. but when a touch of

red and of yellow are also added the color has a subtle attraction much more pleasing to the eye. The same is true in mixing most other colors.

QUESTIONS ON LESSON 12

1. What are tinting colors? Are they used dry for tinting white paint?
2. How much color should be put in at a time in tinting white paint?
3. How can you test and judge best the color of your paint?
4. What are the three primary colors?
5. Can you mix a gloss paint to exactly match a flat color?
6. What are the three secondary or complementary colors?
7. Is the tinting strength of raw umber as great as that of chrome green?
8. How can you mix black paint? Green? Red? Blue? Brown? Yellow?

LESSON 13

PAINTING A NEW COTTAGE

The Weather and the Season: The American habit of painting most homes during the spring of the year has nothing more to commend it than the convenience of house owners in having it done at house-cleaning time. And, of course, we all like to have the house freshly painted and clean at the time nature puts on her new clothes in the form of green leaves and flowers. It is a lot of fun to tidy-up everything at once.

On the other hand, there are practical, technical reasons against the habit. When everybody wants to paint at once the work on each job must be rushed; it cannot be done so well, consequently.

After a winter of rain, ice and snow the lumber in a building is not in the best condition to paint until about July. So, obviously the summer, fall and early winter are the ideal seasons for painting, considering the surface condition. There is a growing tendency to paint now nearly every month in the year, except during the rainy season.

When the thermometer registers 40 degrees or under, paint should not be applied to any exterior surface. This is due to the fact that moisture will condense on the surface at such low temperatures and the paint will not stick; scaling and peeling resulting.

Paint should never be put on while it is raining or snowing, nor while the lumber is wet. Frosts and fog on

fresh paint kill the gloss and cause "washing" of the paint. But cold, dry weather, whenever it is comfortable to work, is just as good for painting as any other as long as the lumber is dry.

On new buildings the priming coat should be put on as soon as possible after the carpenters have completed their work. If a new job is allowed to stand more than a week or two the joints, cracks and nail holes will open up too much.

Ladders and Scaffolds Needed: Just how the surface will be reached to prepare and paint it depends upon the size of the building. Habits of using ladders, scaffolds, trestles and stages differ with the preferences of individuals. The aim should always be to use such equipment as will make you most comfortable in reaching the surface being painted. That increases the amount of work you can accomplish per day, makes it easier for you to do this greater amount of work than less and at the same time eliminates the risk of accidents. Many of the accidents which occur in all of the building trades are the result of over-reaching and losing one's balance. When a man is too lazy, or too indifferent to common sense, to get a longer ladder, to move the scaffold he is working on to a new position, to change one type of equipment for another which makes him safe and comfortable in his work, he receives but little sympathy when accidents occur.

As much work as possible should, naturally, be done from the ground.

Roof cornices, rain gutters and upper wall areas can be reached best with long ladders—(see Figures 26 and 27, Lesson 4). Ladder Brackets (Figure 35, Lesson 4) are made fast to long ladders, and planks are stretched between the ladders for two men to work on them.

The roof cornices, rain gutters and upper walls on many cottages and bungalows are most easily reached by using long trestles (see Figure 30, Lesson 4). Planks placed on top of two or more make a convenient platform from which to work. The planks are dropped to lower ladder rungs as the surface is painted from the top down.

Preparing the Surface: On new buildings little work is needed before the first, or priming coat is spread. Go over the walls, window and door frames, the doors and sash, with a duster and putty knife to remove all dirt, mor-

tar, plaster or other materials splashed on by other tradesmen.

Coat all knots and other excessively sappy places with orange shellac so the pitch will not be drawn out of the lumber and through the paint by the sun, which would discolor the paint.

The Priming Coat: For the mixing of this first coat see Lesson 11, Chapter 4.

It is quite generally agreed that the priming coat on new wood should be of the same composition as succeeding coats so that the different coats may unite with each other to form a single, compact, impervious paint film.

The habit of some painters who prime with most any material handy, thinking that anything is good enough for this coat, because it is covered up anyway, is not a good one. The priming coat is the foundation of all future painting and should be most carefully done and with the best of materials. Old left-over, fatty paint, ground up paint skins and cheap materials are trouble makers when used for priming.

Ochre in former years was popular for priming because it was cheap, but actually it probably, in the end, was the most expensive. Often it is too coarse to penetrate the pores of the wood and secure a firm anchorage. It may never dry hard at all. High grade French ochres are not so objectionable, but their cost usually equals the cost of white lead or good prepared mixed paints. Ochres are treacherous primers.

One of the best priming coats for new wood, it is generally agreed, is pure white lead, pure raw linseed oil and a little turpentine mixed rather thin and well brushed out. The moisture which new lumber sometimes contains will evaporate through this thin primer, hence it is quite important that two or three weeks' time be allowed between the priming coat and the second coat.

Spreading the Paint: Read over again Lesson 10, Chapter 3, and Lesson 11, Chapter 4, concerning the use of a brush and the brushing of paint.

Have a four-inch wall brush (see Figures 1, 2, 3 and 4, Lesson 2, Chapter 2) worked into your pot of paint for the body color.

About a three-inch flat wall brush, or a round pound brush (see Figure 5, Lesson 2) should be worked into the pot of color to be used for the trim.

With the trestles and planks ready or other scaffold from which to reach the surface to be painted, each painter should have the two brushes described and also his duster, putty knife (Figure 45) and a sash tool (see Figures 18, 7 and 8, Lesson 2). Sometimes a third pot of paint for the window sash is needed, but often the trim color is used on sash, too.

It is customary to paint the trim, the wall and the window sash all at one setting of the ladders, using the same or different colors.

When two men are working on the same planks, one will begin his brushing of the paint on the upper right-hand wall, carrying his stretch of paint to the left and about half the length of the plank. He will spread his paint right up close to the trim boards, top and side. He will carry the stretch of paint down the wall as far as can be comfortably reached.

Each brushful of paint is made to cover a little square, brushing it out as far as it covers well, then it is proper to "lay it off," as painters say, meaning to smooth up any brush marks, laps of one brushful over another and the joints—where one small area coated in joins up with another.

This much of the body done, take up your trim color brush and paint the cornice and other trim boards within reach, including corner boards, window frames and sash. It is best to first-coat the rain gutters, down-spouts and other metal with red lead mixed as per Lesson 11.

Any paint spattered on the window glass and other parts should be wiped off just as soon as the painting about the window trim, frame and sash has been completed. A wiping cloth should always be handy in your pocket.

The other man on the plank paints in the same manner such wall, cornice trim and windows as he can reach, making sure to carry his stretches to the right to join up with the paint where the first man stopped, and to make a smooth joint which will not show.

On a three coat job the trim is painted the same color as the body. On the second coat the trim color is started. If the trim color is dark and will cover well in one coat, both the first and second coats on the trim portions are made the same color as the body. Then the trim color is put on the third time over.

In the case of using chrome yellow, an expensive color which covers well in one coat, for colonial yellow body, it is customary to make the first body coat white or white tinted a cream color with the yellow. Then only one coat of the yellow is needed to finish and this saves money without injury to the job.

Putty the Holes: When the priming coat has been completely spread and is dry all cracks, the nail holes and large joints and cracks in the siding should be filled with putty. High grade putty may be purchased, or if the painter desires he can make the putty by mixing keg lead, the white lead-in-oil paste, with a little dry white lead or dry whiting. For a small amount this is usually done in the hands, working the mixture with the fingers until the putty is soft enough to be worked into the holes and yet hard enough to free itself from your fingers and the putty knife. If you get it too stiff add a few drops of linseed oil. Larger amounts of putty are made by mixing these materials on a marble or other stone slab, first with a heavy knife and then by pounding with a mallet. Often the batch is run through the paint mill in the shop first. The ordinary commercial putty made of marble dust is worthless for this and most other purposes. It does not stay where you put it long enough to make it worthwhile.

Often the busy painter cannot be bothered with the making up of putty in his shop. Manufacturers produce very high grade putties of pure white lead and of whiting. Lower grades of putty are also produced by manufacturers. It is up to the painter to be willing to pay a good price and use good putty. He will then get very much better results than by using cheap putty.

The putty should be forced into all holes, cracks and joints with the putty knife, smoothing it off and letting it bulge a trifle, if need be.

Second Coat: Mix this as per instructions in Lesson 11. Brush this coat in the same manner as was described for the priming coat, but of course it must hide the surface better and be spread a little thicker to do so.

Third Coat: Mix as instructed in Lesson 11 and brush it in the manner as previous coats.

How Many Coats are Needed? On new lumber it is best to apply three coats. Then the first coat can be mixed rather thin and to carry enough oil to satisfy the

suction of the lumber. In this way the pigment is carried into the pores of the wood and anchors itself securely for a firm foundation. Three coats make a fine, glossy finished job which wears enough longer, as a rule, than two coats to much more than offset the slight additional cost.

Shingle Stain on Roof: The best méthod to follow in this work is to dip the shingles in the stain about six or eight inches from the thick butt end **before** they are nailed to the roof.

A barrel containing the stain is taken to the job. A drain trough is made of boards or sheet metal to catch any excess stain which may drip off the shingles after dipping. A dozen or two shingles are dipped at a time, butts down, and then stood on the drain trough. Begin this work at least a day before the carpenters want to lay the shingles on the roof, so they will be dry enough to handle.

Shingle stain can be brushed on to the roof after the shingles are all nailed down, but this method only coats one side of each shingle and that does not preserve them so well as dipping which saturates all sides. The brushing is done like the painting of any surface, taking care to fill the cracks and joints well. The stain is thin and easy to brush on. No especial trouble need be taken about smoothing up the work. The stain takes care of that, being so thin. It is well to use old brushes as the rough surface wears the bristles needlessly on new brushes. This is one place where a cheap brush is about as good as a fine one.

For a good job the shingles ought to be dipped and also second coated with the brush after they are laid on the roof.

In place of using shingle stains on wooden shingles, especially upon the side walls of shingled dwellings, it is becoming more popular to apply paint. Paint is very much more durable than stains. Moreover, paints are extremely fire resistant as compared to stains.

For materials see Chapter 3, Lesson 10; also Chapter 7, Lessons 32 and 33.

The Porch Floors: If these have been well built the joints have been coated with thick lead paint before the tongues and grooves were driven together, as each board is nailed in place.

The painters task then is to run a putty knife down each joint to cut loose any lead which was squeezed out of the cracks. Also to go over the entire floor with knife, or scraper, and remove any plaster, mud or other material. Then sandpaper the whole floor quickly and lightly, using No. 1 sandpaper. Brush off the surface with your duster. It is then ready to paint.

Not less than two coats are needed and a much better job will result from three coats. Brush these on the same as was described for other paint. Sandpaper the first and second coats lightly with No. 1 paper and dust off.

To mix your floor paint, use ½ white lead and ½ zinc, and litharge in the proportion of one-seven parts; mix as per Lesson 11, but use only about ¼ linseed oil, ¾ turpentine, the tinting color wanted and a little Japan drier. This proportion for the first coat only.

Mix the second coat in the same manner except that no linseed oil or drier are to be used. The pigment is to be ½ white lead and ½ zinc. The liquid binder should be about 1/5 good floor varnish and 4/5 turpentine.

The third coat should be ½ white lead, ½ zinc, and tinting color mixed with about ¼ turpentine and ¾ floor varnish,—no linseed oil or drier.

When only two coats are to be used eliminate the second coat and mix the third coat the same as for a three coat job.

Porch Ceilings: When the ceiling is made of beaded ceiling lumber it is usually varnished. It is necessary simply to clean it with a scraper or putty knife, sandpaper lightly, dust off and putty the nail holes if any show.

Two coats of spar varnish (exterior) are brushed on in the same manner as paint is brushed, except that the varnish cannot be stretched or brushed out so far as paint. It must be flowed on the surface to some extent. Varnish sets more quickly than paint and so each brushful must be more carefully spread as you go. Be especially careful to dip only a small amount of varnish out of the pot on the brush each time and to immediately wipe off the metal ferrule and handle, should any varnish run down while working overhead. An improperly constructed, cheap brush may leak in this work; also a brush filled too full of varnish will leak.

If the ceiling is to be painted, mix the paint as per

Lesson 11 for new lumber, tinting it light blue, cream or any light color specified. Two coats are enough, usually. Treat this surface the same as any other outside wall, unless the beaded ceiling lumber appears to be unusually full of sap gum. Then use less linseed oil in the first coat and more turpentine,—half oil and half turpentine is often about the right proportion of thinners to use.

Be especially careful to have only a little paint in your brush each dip. Otherwise the grooves in the lumber will wipe off too much and drip. Brush lengthwise of the boards only,—with the grooves, doing the grooves first. Working overhead makes it necessary also to be very careful about using the brush correctly to avoid spattering and having the paint run down the handle of the brush. Have a wiping cloth handy to keep the brush wiped clean, should it leak. A good brush correctly used will not leak even on ceiling work. If you fill the brush too full of paint, or if you "ride" the brush by pushing too hard on it, leaking is likely to result with any brush.

Fences, Lattice, Etc.: These parts of some homes and other outside portions should be painted in exactly the same manner and with the same paint as is used on the side walls of the building.

The Front Door: As a rule these are grained or stained, filled and coated with two coats of spar varnish. This process will be given in later lessons on wood finishing.

If the door is to be painted a dark green, for example, as they often are, rub it smooth with No. 0 or No. ½ sandpaper. Dust off and brush a coat of white lead on mixed with about 1/3 linseed oil and 2/3 turpentine, adding a little Japan drier and enough lamp black to darken the coat to a slate color.

When this coat is dry, in about 12 to 24 hours, rub it down lightly with No. 0 sandpaper, just enough to remove any dust. Brush off with your duster and it is ready for the second coat, after filling any holes with putty which may need it.

Mix the second coat with white lead, a little chrome green or lamp black to darken it as before, so it can be easily covered with the next green coat. Thin this coat only with turpentine, adding a little drier.

When the second coat is thoroughly dry, smooth it

down with sandpaper again, being very careful not to cut through, especially on the edges and mouldings. Rub very lightly and evenly once over the whole surface. Dust off the surface clean. Now mix the color coat, using a dark green Japan color. This is the carriage and automobile painters' color, not green ground in oil such as is used for tinting white paint. A pound can will be ample. Thin this paste with turpentine only to brushing consistency which is just thin enough to flow freely under the brush and cover well, that is, hide the surface well.

The brush to use in spreading this Japan color is the soft, fine camel's hair kind. A good three-inch flat wall brush will also do. This coat will cover and hide the surface completely. It will dry flat.

Let this color coat dry over night. Then wipe it off gently with a cloth, or a handful of curled hair, horse hair, such as the automobile painter uses, to remove dust and dirt nibs. Next brush on a coat of exterior spar varnish. Allow forty-eight hours to dry, rub it down lightly with No. 00 sandpaper. Dust off and flow on a second coat of the same varnish freely and carefully. Watch closely all the time for "runs" of varnish and for fat edges where too much varnish has been wiped off the brush on the edge of a panel or in a corner.

Painting Cypress and Pitch Pine: No task among the many which claim the painter's attention calls for a greater use of skill and good judgment than the proportioning of linseed oil, turpentine and pigment when mixing paint exactly to fit the need of the kinds of lumber being used in building construction today. Years ago when little but white pine was used the painting was comparatively easy to avoid scaling and other paint ills encountered today.

We are referring to the careful, conscientious painter who is not satisfied with an ordinarily good job, the man who wants to paint each kind of surface after the most advanced methods in order to secure for his customer the utmost in service, the maximum durability of the paint.

Such painters have been watching for several years the almost complete change in the character of the lumber they are called upon to paint, from soft white pine and poplar weatherboarding to yellow pine, pitch pine, cypress, fir, gum and others. So today a higher order of intelligence, a wider knowledge of materials and an ob-

serving mind which analyzes paint failures and finds the remedy for them is characteristic of many of our progressive painters.

Today paint is as paint does, and it does some queer things when not mixed just right to be brushed on to the half seasoned lumber one sometimes must paint. And in place of the soft fibre and open grain of white pine and poplar which offered easy penetration and anchorage to the paint, we have cypress with its oily fibre, pitch pine, fir, gum and some others which sometimes have a gum coated fibre and pores completely filled with hard gums and resins. Is it any wonder, then, that the best of paint sometimes fails to attach itself firmly enough to such a surface to avoid peeling off?

On the priming coat for such gum filled lumber the oil and pigment are able to penetrate the surface but slightly. Turpentine is much more effective than linseed oil for this purpose. For the average run of these sap filled lumbers good result will come from increasing the amount of turpentine in the priming coat only. The mixing formula for such lumber is about right when it reads: one-fourth pure raw linseed oil and three-fourths pure turpentine. Lumber which shows less gum filling the pores will absorb a little more oil, so make the formula read: One-half pure linseed oil and one-half pure turpentine.

When you paint lumber which is filled with gum much more than the average run of these lumbers it is necessary often to give special treatment to the surface before painting it, if you would produce a job you can afford to guarantee against peeling. A wash over with benzol or solvent naphtha or even turpentine just ahead of the brushing will often dissolve the gum on the surface enough to let the paint take hold. A blow-torch flame passed over the surface quickly has the same effect of roughing up the surface a little. The addition to the priming coat only of one pint of benzole (160 degrees solvent naphtha) to each gallon of paint will soften the gum long enough to let the paint get its anchorage. Benzole evaporates very quickly and is a powerful solvent. Mix it into the paint just before you spread it. Do not use it in the second coat, as it will soften up the priming coat then.

A pigment mixture of three-fourths red lead and one-fourth white lead for the priming coat only used with the

thinners mentioned is thought by some painters to gain even a better anchorage than white lead alone Turpentine substitutes do not possess the power of penetrating the surface to the same degree as pure turpentine. For that reason they are less desirable for use on the lumbers being discussed, and should not be used.

Just which of the mixtures and treatments suggested ought to be used for a given surface must be determined by the painter's judgment after a study of the particular run of lumber to be painted. A look at it with a pocket microscope or a magnifying glass will help judge the surface. After a few examinations and some experience along this line you will come to know at a glance just what treatment is needed by each surface. This method is not suited to the painting of dry, porous lumber. Such a small amount of linseed oil would permit the pigment to wear off or chalk off, soon after the oil had been absorbed by the lumber.

The second coat on gum filled lumber ought to carry at least half linseed oil and half turpentine for most surfaces.

The third coat, or the last coat, should be a mixture of pure white lead and pure raw linseed oil, with a little turpentine and a small amount of Japan drier.

QUESTIONS ON LESSON 13

1. What season of the year is best for exterior painting? What relation has temperature, moisture, frost to painting success?
2. What ladders are needed to reach the cornice on a one and one-half story cottage for painting?
3. What preparatory work is necessary before painting new exterior lumber?
4. What treatment do knots require?
5. How important is the composition of the priming coat on new lumber?
6. On what part of a wall do you begin to paint, top or bottom, right or left?
7. How soon should the painting of a new house begin after the carpenters finish?
8. Why putty up holes?
9. How do you mix putty?—how color it?
10. Are two coats of paint enough on new buildings?
11. How many coats of shingle stain are needed.
12. What is the special treatment given cypress and pitch pine?

LESSON 14

RE-PAINTING AN OLD COTTAGE

For this undertaking the application of the paint and the scaffolding or ladders needed to reach the surface, of course, remain the same as for new work. The mixing of the paint is directed in Lesson 11; there also the proportions of materials, lead, oil, turpentine and drier needed are given.

Preparing the Surface: The chief concern on old work is the proper preparation of the surface. It is difficult at times to know just how far to go with preparatory work. It is slow and quite expensive at best sometimes.

If the old paint is just faded, dirty and is rubbing off in a dust form,—is chalking, about all the preparatory work needed is to dust off the surface just ahead of your brushing on of the paint. Cracks and holes in the lumber of any considerable size should be filled with putty after the first coat.

Paint Blisters: If the old paint is not firmly attached to the surface in places, but is blistered in round patches of various sizes, from the size of a penny to as large as the hand, the loose paint should be scraped off clean with the putty knife. Do not confuse paint blisters with general cracking and scaling, however. Blisters occur only here and there as a rule, though they may come in groups. They are like a water blister on your hand. The paint all around the blister is firm. These blisters are formed by the sun drawing moisture out of the lumber or by the expansion of the paint while elastic, and may be on a perfectly dry surface.

Cracking and scaling of the paint generally, is the result usually of faulty paint mixtures; the pigment was made too hard and inelastic to stretch and contract with the lumber during temperature changes. In the case of cracking and scaling the paint usually scales off continuously for quite an area; this may be caused by water from beneath.

Burning and Scraping Scaled Paint: Sooner or later every painter faces the difficult situation occasioned by his being called upon to paint a house the old paint upon which is scaling off. Then it is difficult to decide whether to prepare the surface simply by brushing off the old scales with the putty knife, dusting off and then repainting in the best manner, hoping it will stick;—or to

conclude that all of the old paint ought really to be taken off down to the bare wood. That naturally brings up the cost of the job materially.

Experience proves that when old paint on a house is scaling off quite generally, because it is too hard and inelastic to expand and contract with the wood during temperature changes, the most certain way to repaint that house so scaling will not again occur, the only kind of a job a painter can afford to guarantee, is to remove every inch of the old paint down to the bare wood. Then repaint to gain a new foundation. If the scaling is caused by water in the wood, it is useless to repaint unless you can remove the cause, which is often some distance from the parts that are peeling. Gas tanks are successfully used in burning off paint on very large operations.

It is only reasonable to assume that because most of the old paint scaled, all of it will do so sooner or later, presumably it was all the same kind of paint. No material you can spread on top of it will help to the anchorage of the old paint. As long as any of the old paint remains on the surface it prevents the new coats from gaining a firm hold on the wood. So when the old paint lets go all coats above it necessarily come off with it. Nine times out of ten when paint cracks and scales off the fault is with the priming coat next to the wood. The kind of paint that scales off is also too hard and brittle to permit the oil of new coats to penetrate through it to the wood, thus renewing the anchorage and life of the old paint by strengthening the binder. The semi-porous structure of pure white lead and linseed oil paint permits the passage of oil from new paint into old coats on the surface.

Now, as to when old paint is scaling in such a way as to demand removal completely from all of the surface area is a matter to be decided by individual cases. Do not mistake an occasional patch of scaling paint over knots, sap and gum filled boards or water soaked boards, for a case of general scaling. Neither should blistering and peeling, due to moisture or sap being drawn out of green and wet lumber by the sun, be mistaken for scaling of hard, inelastic paint. A careful examination of the surface and paint scales, with or without a magnifying glass, coupled with a size-up of the whole job, how and when it was painted, with what material, kind of lumber, etc., since the house was built, will enable you to know

why the paint scaled. As a rule it is wise to burn and scrape off the paint from the entire surface of a house only when that house has a reputation for scaling every time it is painted. Of course, burning and scraping off certain parts which have scaled is done on many houses.

A curious fact about scaling of paint is that it usually occurs after the third painting; that is, when the house is from nine to twelve years old. The paint film which is too hard to chalk off probably gets so thick and heavy by the time the third painting has been done that the weak binder of the priming coat cannot sustain the weight longer.

Once you know the probable cause of the scaling of old paint on a house and that your new job likely will scale, too, unless all of the old paint is removed, and in spite of your using the best of materials, labor and care in doing the work, it will be wiser by far to lay the facts before the owner, being careful to make clear the reason why no kind of new paint can stand on a crumbling foundation. He will credit you with knowing your business and that means confidence. If he will not, or cannot, stand the expense of removing the old paint and doing the job right, by all means make him understand that you can paint the house as well as anyone can without taking off the old paint, that you will do your best to give the old paint every chance to hold and avoid scaling. That by scraping off the loose paint and cleaning up the surface you will reduce the risk as much as possible. That the paint you propose using will adhere to the surface without scaling if any paint under the sun will, but that he must share the responsibility after you have done your best. You cannot guarantee against scaling when painting over the old paint of this kind, but you can do your best to delay or overcome further scaling. It may not scale again, but the chances are against you. It may be delayed a long time.

The apparent difficulty of removing scaling paint undoubtedly deters many house owners from having it done, and some painters, too, no doubt. Yet, like many other tasks, it is not really difficult nor terribly expensive when the correct method is followed. The "know how" is especially essential here.

Considering the removal of scaling paint on large exterior surfaces the old method—by using the gasoline blow torch (see Figure 44, Chapter 2) and broad knife

scrapers is still the best, quickest and cheapest: On metal surfaces only, steel wire brushes are useful, too. The use of liquid patent removers is often just as satisfactory from every standpoint except expense. When the old paint is many coats thick and difficult for the liquid removers to cut through, the labor cost and the cost of the remover itself usually exceeds that of using the blow torch.

A proposal to burn and scrape off the old paint sometimes meets with disapproval because of the assumed fire risk. The very rare instances where the painters' torch has set fire to a building have been given great publicity, both by the press and word of mouth. The number of fires resulting from this cause is remarkably small, however, as compared to the great number of jobs done. More fires occur in a single day starting from furnaces and electric wires about houses than occur in a year from the painter's torch. Yet no one thinks of giving up the use of either furnace or electricity. The fire risk is largely talk and you should lose no opportunity to say so. How many fires do *you* know as having really occurred from the blow torch? Mostly, you have heard someone say they occur, but you have not seen them yourself.

While removing old paint with a torch, the exercise of ordinary care and common sense are all that are necessary to make it perfectly safe. In some communities there have been passed fire ordinances in which the use of the blow torch is referred to. You should be familiar with the local law on the subject. When the law prohibits the burning of paint on a building with a blow torch, then the only practical alternative is to use a liquid paint remover.

The first requirement for doing a good job is the best gasoline torch to be had and of large capacity. The small torches made for soldering are not capable of delivering enough heat to enable you to strip off the paint continuously. When you have a good torch take care of it, especially should the nozzle outlet for the gasoline be cleaned often. It clogs with carbon and grit from the gasoline. Use the best gasoline you can buy, keep the tank fairly filled and pump it up regularly to insure a steady heat.

For the burning operation do not select a windy day; the heat from the torch is blown away too rapidly. Begin burning on the right side of the wall and work toward the left, holding the torch in the left hand and the knife

scraper in the right. Wear canvas gloves. Point the flame a little downward, never up and under the weatherboards. Remember that what risk of fire exists is in holding the flame over and under loose boards, loose joints and cracks under which will usually be found dry building paper and sometimes dry shavings. Birds' nests under eaves and in such places must be looked out for. Hold the flame a couple of inches from the boards and on one spot only long enough to blister the paint and let the knife pushed by the right hand, slip under the paint and strip it off. Do not attempt to dig or hack the paint off. Let the torch do the work. The knife will slip along steadily but slowly when handled as it should be on most jobs. Some paint is too hard and dry to strip off well, however. Go at this paint with about one-fourth turpentine and three-fourths linseed oil, raw, to soften the paint. Let it stand a day or two for this purpose.

FIG. 56

When you set the torch down to rest, be certain that the flame is pointed away from anything which might catch fire.

Weatherbeaten Surfaces: Such a surface has little if any paint on it and so the chief difficulty is to fill the pores and stop the suction in the painting of it. The safest way to do this is simply to apply enough coats to build up a surface. Three coats will do it sometimes, but four are often needed to make the job look right. Mix the paint as usual for new outside work, using very little if any turpentine. Oil is mostly needed to seal up the wood, stopping suction by filling the pores with pigment and oil.

QUESTIONS ON LESSON 14

1. What causes paint blisters? How are they removed?
2. Describe the method followed for removing scaling paint with a blow-torch?
3. Why is it sometimes necessary to remove cracked and scaled paint?
4. Are liquid paint removers successful in removing such paint?
5. How should a weatherbeaten surface be painted?

LESSON 15

PAINTING LARGER BUILDINGS

The principal difference between painting large and small buildings is in the equipment needed to reach the surface. Most frame wood residences can be reached by the same long ladders, ladder brackets (Figure 26, Lesson 4) and planks as are used on smaller homes.

Swing Stages: Three story and higher buildings require the use of swing-stage, cornice hooks and rope falls, as shown in Figure 57. (Illustrate swing stage complete on building.) Lesson 4, Figures 39 to 43 inclusive describe this equipment fully.

The cornice hooks are placed over the capstone on the top of the wall which is usually brick. A tie-back rope is made fast to the cornice hook on one end through the ring in the hook for that purpose. The rope is then carried back on the roof to a chimney or other strong point where it is made fast. It keeps the cornice hook from slipping out of place. It divides the strain on the capstone, so that if it should break and work loose it would still be held to its position on top of the wall by the ropes. If the wall should crumble underneath the hook, the rope would still hold the hook to the roof.

The eye on the lower end of the shank of the cornice hook is bent out enough to allow the fall line, the rope down to the stage, to run freely in the upper block without rubbing between the block and the wall.

There is one right and several wrong ways of rigging the falls,—the blocks and tackle ropes which hold the swing stage. See Figures 58 and 59.

The upper block has two pulley wheels in it. This is hooked through the cornice hook-eye so the point of the hook is pointed in toward the center of the stage platform.

The lower block has one pulley wheel in it, a hook on the bottom and an eye on the top. The hook is passed through the eye on the metal stirrup which holds the stage platform so the hook points in also. Describing the rigging of the block and tackle on the left side of the stage: The rope which is ⅞ or 1 inch thick is made fast to the eye loop on top of the lower block, using a secure knot. The other end of the rope is run through the inside pulley wheel, the one next to the wall on the upper block;—put it through from the outside in. Run it down and through the pulley wheel of the lower block, from the inside out;

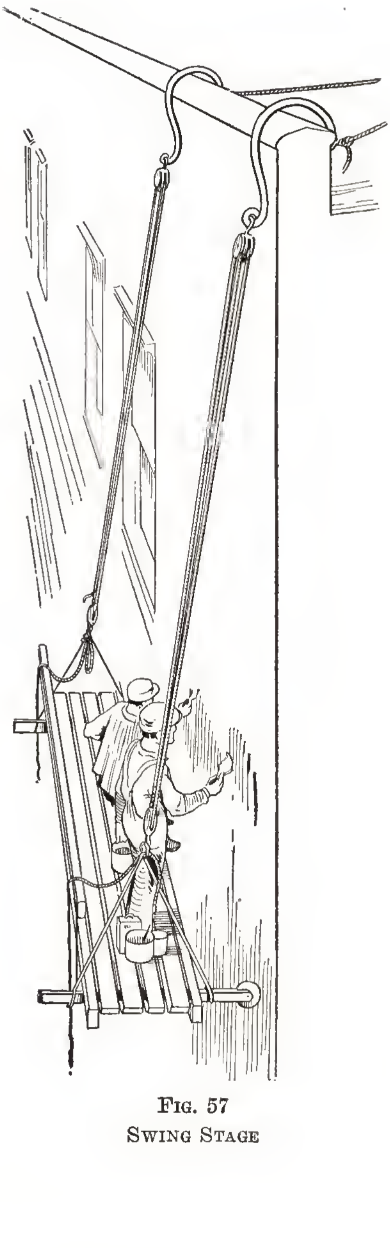


Fig. 57
Swing Stage

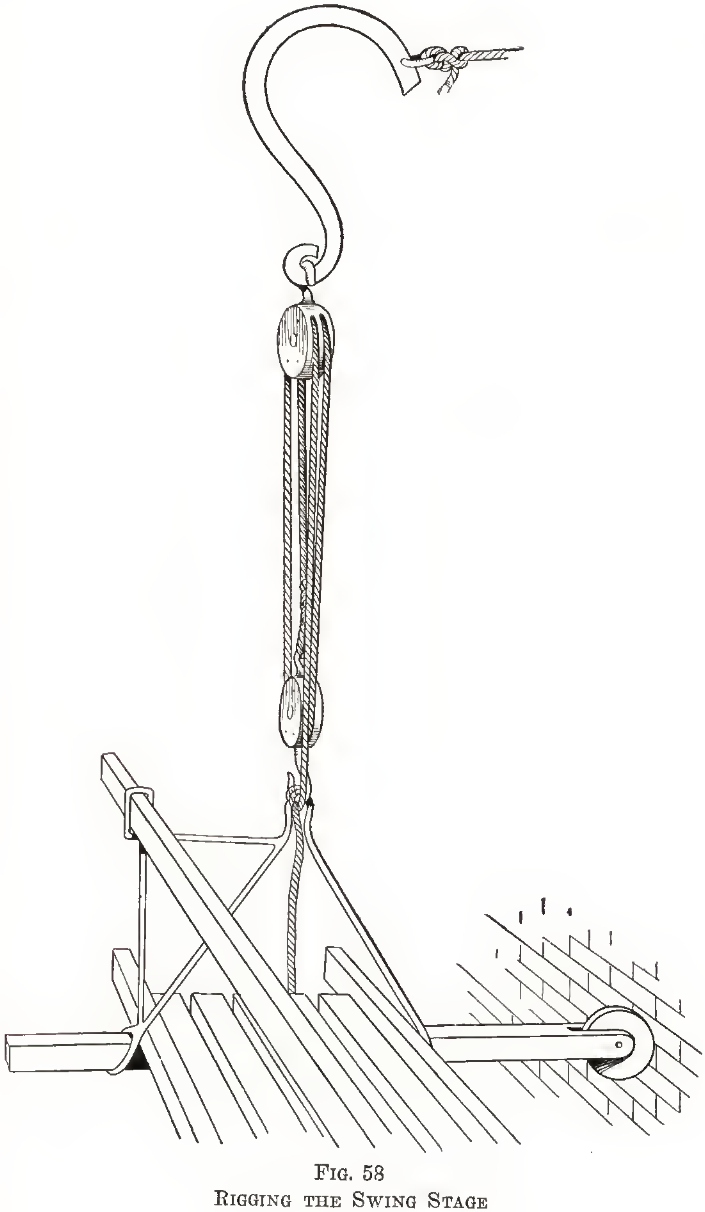


Fig. 58
Rigging the Swing Stage

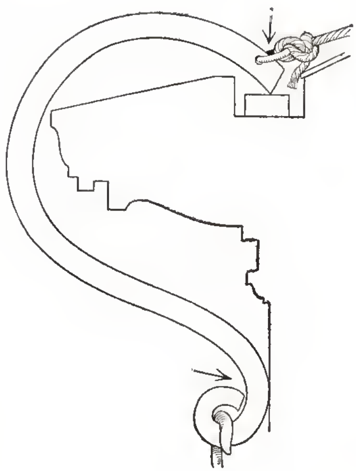
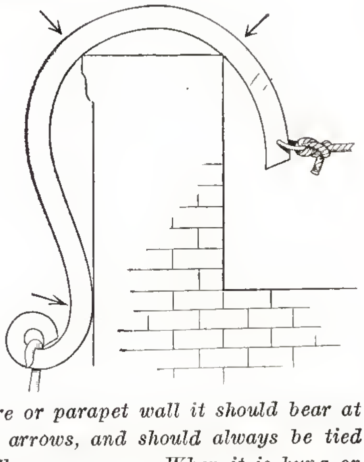


FIG. 59



When a hook is hung over a fire or parapet wall it should bear at three points, as indicated by the arrows, and should always be tied back no matter how solid the wall may appcar. When it is hung on the point, it should bear at two points only as indicated by two of the arrows; the arc should be clear.

then carry the rope end up and pass it through the outside wheel of the upper block. When this is correctly rigged, the free end of the rope used to pull the stage up and let it down will come over the top block and point to the inside, the center of the stage platform. The rigging of the block and tackle on the right side of the swing stage is done in the same way,—so the free end of the rope comes through the upper block, outside wheel, on the inside toward the center of the platform.

When the stage is raised off of the ground by one painter pulling on the free end of the rope on each side of the platform, the free end of the rope must be made fast to the upper part of the metal stirrup to hold the platform permanently at the desired elevation. This is done by using different forms of knots and hitches which are secure, and yet which can be easily loosened. The illustration shows knots used for this purpose, Figure 62.

In many cities there is an ordinance requiring a rail on all swing stages at the back, the outside for safety reasons. For this purpose the iron stirrups with one of its rods looped to receive the safety rail is the best; better than the old style rope stirrup. The bumpers being detached from the stirrup have also the advantage of allowing you to place them so they will miss windows or obstructions when there is an advantage in hanging falls over them.

Common ladders should not be used for stage platforms, as they are not strong enough. If it is necessary, be sure to reinforce them by using strong planks for the platform. Stage ladders are not expensive and are safest.

After a swing stage is hung, it should be hauled up about a foot from the ground and tested by the men jumping on the platform at each fall. A man on the roof should notice the effect of the strain and if there is any give, it should be overcome before the platform is raised and used. Even this test is not always conclusive, for when the swing is pulled up the angle, and consequently the strain, is different. It behooves the men to be extremely careful about this rigging of swing stages. Never put sharp, pointed hooks in a gutter unless they rest on wooden blocks; even then they are unsafe.

New swing apprentices must be very careful to *keep their weight on the outside edge of the stage* and their *hands off the wall.* It takes but a small push against the wall with the hands to force the swing stage away from the wall and to topple one or both men off.

Some of the older painters practice the habit of fasten-

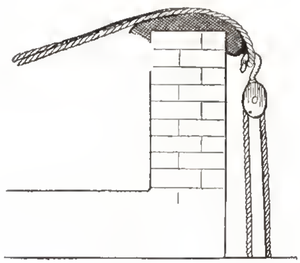


Fig. 61
Rope Lookout

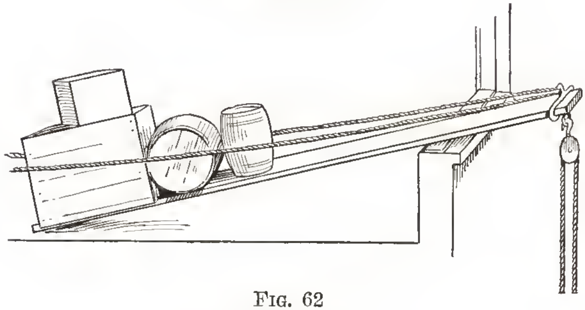


Fig. 62
Cantilever Lookout

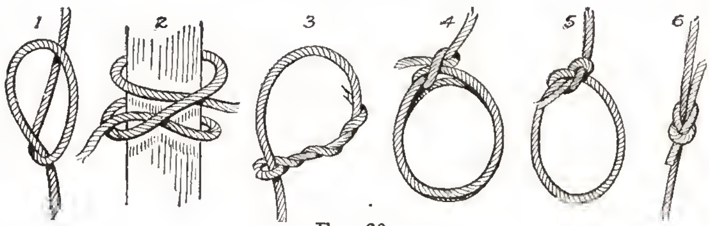


Fig. 60
Useful Knots

1. Backwall hitch for making the falls fast to the hook.

2. Clove hitch for making a rope end fast or turning a strong eye in the bight to hook into.

3. Timber hitch for making a rope end fast to plank or timber for hoisting or lowering.

4. Round turn and two half hitches for making a rope end fast to and lead from any part of something with a large diameter.

5. Rowline for making any size eye that will not run.

6. Square or reef knot for uniting two rope ends.

ing the upper block of the falls on a swing stage to the wall without the use of cornice hooks. If this becomes necessary, great care must be shown to make it safe. It is called the rope lookout method and should be avoided, if possible. When necessary make a loop with a strong one-inch rope drawing both ends back over the cap stone of the wall, after the hook of the upper block is made fast in the loop. Both ends of the rope used for this loop should be carried back over the roof and made fast to some strong part of the building, tie the rope around a chimney if you can. Then the hook in the block should be made fast to the loop in the rope with an artificer's knot which is a form of clove hitch made in the loop of the rope. A pad of carpet or of burlap must be placed under the rope loop where it comes in contact with the corner of the wall; this to prevent the corner from cutting the rope. A rope bent sharply over an edge loses most of its strength, as the strain is thrown on the upper strands, the lower ones being contracted. For a rope to retain all of its strength it must be bent over an arc at least seven or eight times its diameter. See Figure 61.

The use of the cantilever lookout is also more or less impractical and dangerous. When necessary to construct this, remember that the farther you place the hook out from the wall and from the fulcrum of the lever the greater you will have to make the balancing load. See illustration Figure 62. It is rather common practice for painters to stick out a plank to hang the blocks to, using anything handy on the long end of the plank to balance the load of the swing stage. There is a story of some painters who hung a rig of this kind out of a window of a tobacco warehouse and used cases of tobacco for counterbalances on the planks. A husky employee of the tobacco company who was not paid for what he knew, came along with a truck and removed the cases on one plank. You can tell what happened to the painters on the swing stage. It is well to know what you use for a counter weight and that it will remain where you put it.

A word about the care of the ropes is important. The price of safety is everlasting vigilance about ropes, ladders and other items of equipment. Ropes should be stored in dry places where no possible chance exists that acids or acid fumes can come in contact with them. And any damage done to even one strand of a rope should be repaired on the spot, lest you forget it.

Tying Rope Knots: A knowledge of the tying of knots is indispensable in the handling a swing stage or roping a scaffold to best advantage. There are hundreds of knots, hitches and bends, possibly twenty that are commonly used. Of these the Backwall hitch for making the running part of a tackle fast to the hook; the Clove hitch, for making a rope end fast or turning a tight double-strength eye in the bight (the loop) of a rope; the Timber Hitch, for making a rope end fast to a plank or timber for hoisting or lowering; the Square, or Reef Knot, for uniting two rope ends; the Bowline, for making an eye that will not run; the Round-turn and two half hitches, for making a rope end fast to and lead from any part of anything with a large diameter; and the proper use of half hitches, are all knots which are peculiarly adapted to uses of the painter. These knots are all easy to tie, will not jam tight under strain and therefore are easy to loosen. There are others, but the man who masters these will be able to take care of himself in any situation. See Figure 60.

Painting Roofs: A fast method of staining or painting large roofs, the usual gable or double pitch roof is to fix up a pair of shoes with sharp nails in the bottoms so you can walk without danger of slipping. Just get a pair of leather soles, drive them full of short nails so the points will come through the soles about three-sixteenths of an inch. Then have the soles nailed on to your shoes. Then if a tripod pot holder is made with the three legs sharp and one of them loose so the tripod can be made to set level on any roof, this work can be done very rapidly and without danger of falling.

QUESTIONS ON LESSON 15

1. When and where are swing-stages used?
2. Why is it necessary to be steady and careful when working on and handling swing-stages?
3. What is a cantilever lookout?
4. What is a clove hitch? A timber hitch? A reef knot?

CHAPTER 5

Interior Decorating

LESSON 16

PREPARING WALLS FOR PAINTING

Preparing New Hard-Finish Plaster: First see that all splashes of mortar and rough places are smoothed down level with fine sandpaper on a flat block of wood. Be careful not to cut through the glazed surface, or you will produce a suction spot. Blisters in the plaster caused by imperfect mixing ought to be cut out, filled in and treated as suggested in Lesson 17.

Now fill all cracks or openings around door and window frames with the putty also. When the fillings are dry, clean up all dust from ladders, planks, floors, etc. and wipe up room generally before beginning to paint.

Now apply a coat of paint to all the fillings and spots that may have been cut through the glaze in sandpapering to make them smooth. It is a good plan to touch these places with a coat or two of thick paint, lead thinned only with turpentine. If shellac is used, a gloss spot will show after the finish.

It is best, usually, to permit new plaster walls to stand a few months so the lime will have become thoroughly burned out or slaked; although under present-day building conditions they are often painted, and successfully too, but a few weeks after they have become dry.

A wash sometimes used to neutralize the causticity of new walls is made by adding about a pint of strong vinegar to four gallons of water. It is brushed on and, of course, it is then necessary to allow the walls to dry thoroughly before painting. A more certain way to neutralize the causticity of the lime in new walls, is to wash them with a solution of two pounds of sulphate of zinc dissolved in one gallon of water. Brush it on and let the walls dry before painting.

When new plaster is too soft and chalks off excessively, apply by brush, sponge or spray water until the walls are thoroughly soaked. Allow four or five days for drying and the plaster will then be hard.

Preparing Old Plaster: Thorough preparation by filling, pointing up and leveling cracks and holes in plaster walls, as per Lesson 17, most certainly is important when good work stands before price and a nice job is expected. The work is best done on the time and material basis, as the time required is too uncertain to cover by contract. An hour supposed to have been saved on preparatory work may cause the loss of two or three hours in brushing over, touching-up and patching after the painting. And what is more, touching-up after can never accomplish what should have been done before painting.

Preparing Old Stucco, Rough-Cast and Sand-Finish Walls: It is quite difficult to prepare cracks in this kind of surface. If considerable care is taken in filling, a passable job can be had, particularly if sand is mixed with the filling putty which is put into the cracks as per Lesson 17.

Brush down new walls with a broom to remove any loose sand. And new stucco walls, or rough-cast cement walls that are not allowed to stand for six months to a year, ought to have the causticity of the cement neutralized with a wash composed of two pounds of sulphate of zinc to one gallon of water. This will offset the tendency of the hot spots of cement causticity to burn flat spots and discolored spots in your finished coat of paint. It is generally conceded that varnish size is impractical for rough walls, but a glue-size of a little greater strength can be used than is permissible for smooth finish walls. The broken surface on a rough wall prevents the glue-size from scaling as it does when used too strong on smooth walls. The glue-size will also bind together the loose sand on the surface and assist in stopping suction.

Preparing Old Painted Walls: Assuming that the paint is firmly attached to the walls and is soiled, it is necessary only to remove the grease and dirt. So, wash the walls with a sponge, as per Lesson 17—"Washing Painted Walls". Be sure to cover the floor carefully with drop cloths. When soda is used it may injure paint or varnish on the floors. Do not paint the walls until they are dry. Any cracks or holes should be filled with putty and treated as per Lesson 17.

Preparing New Wall-Board: This material makes an excellent surface for painting. Some brands of this material come already sized. If not sized, it should be with a good interior spar varnish thinned with turpentine to

about the consistency of linseed oil. By adding to the varnish-size a small quantity of the paint to be used, just enough to color it, the size coat will often answer the purpose of the priming coat. The paint put in the size helps greatly to hide dark colored walls when they are being painted with light colored paint. This varnish-size coat should be given plenty of time to dry, at least over night and longer is better. Do not use glue-size on wall-board. A gallon of prepared flat wall paint thinned with ½ gallon of boiled linseed oil is also a good size for wall-board.

As a rule the cracks between sections of wall board are covered with mouldings put on by the carpenter. The painter stains the mouldings before they are nailed in place, however. If no mouldings are to be used, it is very difficult to fill the cracks with putty so they will not show, unless special care has been taken by the carpenter to get straight studding and to nail the wall board with few nails carefully placed.

The best chance to decorate a wall board surface without mouldings is to paste a strip of kraft gummed paper tape over each seam; then cover the entire wall with thick lining wall paper. Finish with a covering of muslin, canvas or burlap to be painted; or cover with wall paper.

Removing Old Wall Paper: Wet thoroughly with warm water, using a sponge to apply it. Then scrape off all of the paper with a broad scraper or putty knife. This is not always an easy task, especially when several thicknesses of paper are present or when a varnish coat has been applied to the paper, as was done sometimes a few years back.

Great care must be taken to avoid injuring the plaster walls by scraping through the glazed surface. If the plaster is poor and pulls off in places, the holes must be filled along the cracks as per Lesson 17.

After filling it is often necessary to give such a wall a coat of shellac all over to stop suction and make a uniform surface for painting. If a uniform surface does not present itself after a coat of shellac and a coat of paint; that is, if the paint soaks into porous spots and has no gloss, shellac again before applying the second coat of paint. A better treatment, perhaps, is to shellac the porous, scraped places and then coat with a good varnish-size as per Lesson 18. This will seal up the porous places so your paint coats will dry with a uniform lustre.

Immediately after the paper has been removed and while the walls are wet, wash them clean with sponge and warm water to remove paste and glue size. A bit of washing powder or sal soda in the water helps. You will save yourself much sandpapering in this manner. The ink used in printing some of the strongly colored wall papers may run down and stain the baseboards and floors, so watch this carefully and wipe up all runs. Use a drop cloth to protect the floors.

Removing Old Calcimine: Wash off all the calcimine with warm water as per Lesson 17. Then repair cracks and holes as per Lesson 17 also.

Calcimine on sand-finished walls is extremely hard to remove. Except when it is scaling off do not attempt to remove it entirely, but paint right over it after giving a good coat of boiled linseed oil and a little turpentine to penetrate and bind it to the surface. Permit the oil to dry thoroughly. Calcimine is so firmly anchored on such a surface as a rule that removal is unnecessary.

Removing Gloss Oil Size: Gloss oil size has been used on many walls under calcimine. If the wall is to be again calcimined or painted, it is not necessary to remove the gloss oil. But neither wall paper nor canvas, muslin nor burlap can be made to stick to it any length of time. So it must come off for these coverings or be treated as below. The removal of gloss oil is done by dissolving or scraping off by washing with a solution of strong sal soda (washing soda) and hot water. Dissolve the soda completely in water, put it on with an old brush (the soda will destroy the bristles of a good brush) and then wash off with a sponge and clean warm water.

A cheaper and quicker plan to use in treating such a wall for wall papering or covering with canvas, muslin or burlap is to put on one coat of white lead thinned only with turpentine and tinted to suit,—brush it on right over the gloss oil size. When this paint coat is dry, put on a sugar-size. Make this size by dissolving brown sugar in warm water and then brush it on. Do not make the size too strong: Add just enough sugar to the water to make it slightly sticky. To test it, dip your fingers in and let the size dry on them. It should feel only slightly sticky, then; like glue size does when properly mixed.

Removing Scaling Paint: On interior plaster walls paint will seldom scale off, except when too strong a mixture of glue-size has been used. Usually it is necessary

only to scrape off loose scales in places and sandpaper the surface down smooth, shellac the bare spots, fill cracks and paint as per Lessons 17 and 20.

It rarely will be necessary to remove all the paint, but when a considerable area must be removed, the use of the blow-torch as per Lesson 14, or the application of liquid paint remover as per the manufacturers' directions, are the only ways to do it. The digging and scraping off of the paint cuts through the glaze of the plaster, often; and so it is often necessary to cover the wall with one or two coats of orange shellac, or varnish-size, to even it up as to suction and make a uniform surface to work on.

QUESTIONS ON LESSON 16

1. Describe briefly the preparations of new hard-finish plaster walls for painting.
2. How should new "hot" or caustic lime walls be treated before painting?
3. How should an old plaster wall be prepared for painting?
4. How can old wall paper be removed?
5. Can old calcimine be removed?
6. Why must gloss oil be removed sometimes?

LESSON 17

PATCHING PLASTER WALLS

Cutting-Out Cracks and Holes: Where partitions or shelves have been torn out leaving large holes in the wall, they should be patched by a plasterer; but small cracks can best be taken care of by the decorator, also small holes, as he will usually do it more carefully.

When plaster cracks it usually bulges on one or both sides of the crack. One edge will be higher than the other, often. To level it up cut away the bulging plaster clear down to the lath until a straight-edge, or rule, shows both sides to be perfectly level. It may be necessary to make a crack an inch or two wide to do this. Use sandpaper, No. 0 or ½ on a flat block of wood to smooth up the surface around the crack or hole, but do not rub too hard, not more than is absolutely necessary to smooth up the work.

In cleaning out a crack or hole, cut away the under edge of the plaster further back than the surface edge, so the crack will present the shape of an inverted "V" (like a dovetailed mortise joint, or a keystone) and thus enable the filling of putty to wedge itself in. See Figure

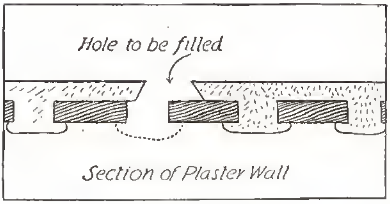


FIG. 63

63. Thoroughly soak the edges of the open cracks with water. There should be no sharp points or loose plaster near the edges of the patch. It is well to shape the cut-out holes round. Cracks filled without being cut-out, usually show a beveled edge which is almost as bad as the unfilled cracks. By widening a crack it is less apt to show when properly filled.

Making Plaster of Paris Putty: Be sure to get new, fresh plaster of Paris. Then do not stir or mix the water in but simply pour water over it. Allow the plaster to soak up what water it needs. Then do the mixing in your fingers when a handful of putty is taken out to begin the filling of holes. This prevents the plaster from setting too rapidly and it is better to use it without vinegar, which is sometimes used to slow up the setting, if possible.

When plaster of Paris sets too quickly to handle it properly, a small amount of vinegar or glue must be put in the water to slow it up. It is thought by some master painters, however, that this has a tendency to break the bond of the plaster, making it too brittle. They think a better way to slow up the setting of plaster of Paris putty is to add a little slaked lime. Ordinary quick lime soaked in water slakes itself and will keep indefinitely. It is handy to keep a batch in the shop so you can take a small amount to each job to mix with the plaster of Paris as needed.

The putty used to fill holes and cracks may be plaster of Paris and slacked lime, half and half; it may be plaster of Paris alone; it may be one of the prepared putty materials now on the market.

Filling Cracks and Holes: In this work it is well to substitute for the putty knife, scraper or stopping knife, as they are called, knife blades made of wood shaped like a putty knife. Steel knives leave marks at times which show up in the paint. It is probably true, however, that the regular putty knife is most commonly used for this work.

Fill the cracks with this putty to which a little sand is added for the first filling only on hard-finish plaster

walls, but for both coats on sand-finished walls. Fill the holes and cracks up within one-eighth of an inch of the top of the surface, pressing in the putty hard to be sure it is packed. Let it dry hard. It will shrink somewhat in drying and so a second filling (without the sand for smooth, hard-finish walls) is to be knifed into the holes carefully. This, not only to complete the filling of the hole and level it up with the surface, but to smooth up and glaze the top of the plaster filling. This smoothing of the top putty filling glazes or packs it finely and it is not then so porous as unglazed plaster or putty. It does not, therefore, absorb excessively the oil from paint coats put on. When patches of putty are not sufficiently knifed to glaze the top and are porous, the oil absorbed from the paint coat will leave a flat spot or a discolored spot in the finished paint coat.

On smooth walls brush over the filling of putty when completed with water before the plaster sets. The water helps to smooth up the edges of the filling nicely. For sand-finish walls stipple the filling before the plaster sets, using a stub end of an old brush to pound the filling gently and so rough it up like the balance of the wall. In other words you want to make the patch look as near like the rough sand-finish as possible. A smooth patch in a rough surfaced wall would not look well.

Do not sandpaper new fillings of putty, unless it is to barely touch-up the edges, as this will cut through the glazed surface and make a porous spot. With sufficient smoothing with the knife blade the surface can be made so smooth that the hole or cracks cannot be found after painting. When thoroughly dry coat the patches with thin orange shellac and with about two coats of thick paint,—lead thinned only with turpentine. Then your wall is ready to paint.

Another method to make a non-porous patch is to fill the holes and cracks with plaster of Paris as above up to about one-sixteenth of an inch from the top; let the filling dry and fill again with a glazing putty made by mixing together three-fourths whiting and one-fourth white lead. Add enough Japan drier to make a stiff putty. Pound the putty with a mallet in the mixing, mix it thoroughly, fill the cracks and smooth up with a knife sufficiently to produce a glaze and to level up the filling. This mixture used a little thinner is excellent for glazing over scraped porous spots or holes in plaster after removing wall

paper or paint. After it is dry it is well to sandpaper lightly to smooth up.

When larger holes are filled with the usual lime and sand mixture by a plasterer, or with patent plaster fillings, one or two additional coats of paint are necessary, as the hot lime causes the color to change and oil paint seems to raise the filling and make the edges more prominent, just as water raises the grain of wood. And of course shellaced places should be coated with thick paint as mentioned above—lead thinned with turpentine only; otherwise, a glossy spot,—a "Shiner" will appear over the shellac on the finished coat.

Cracks which are too small to fill ought to be shellaced. If not treated in this manner the cracks will draw oil out of your paint and show up darker than the balance of the wall.

Filling Surface Scratches: Often walls are scratched with furniture or bruised so as to present an unsightly surface and yet the plaster is not cracked through. Fill and level up such places with a glazing putty made as follows: Mix together whiting, warm glue-size and plaster of Paris to a stiff paste. Add a little varnish, preferably rubbing varnish. This putty can be sandpapered, worked out very thin to even up sunken places and scratches. It does not set hard too quickly, nor does it swell or shrink. It is seldom used for large cracks as it dries more slowly than plaster of Paris, but sets extremely hard. It is also suitable for glazing over porous spots in plaster that have been scraped or sandpapered until the glaze is gone. It will not soak up an excessive amount of paint.

Filling Fire Cracks: These are the very fine hair lines noticed on some old plaster walls. Each crack is too small to fill and they are too numerous. One treatment is to have the wall very dry and then brush on a coat of boiled linseed oil, with a little turpentine in it, but no pigment. When dry it is ready to paint.

Another treatment for cracks of a little larger nature is to mix white lead with a very little turpentine and then rub this thick paste into the small cracks with a rag. Sandpaper lightly when dry.

Often a coat of glue-size or varnish-size, as per Lesson 18, put on after the first coat of paint will entirely seal up such small cracks.

Some painters believe that the most certain way to

cover such small cracks is to brush on a coat of thick paint thinned only with turpentine and colored to suit. It should be as thick as possible and yet spread out evenly without piling up the pigment too much under the brush, or making rough places difficult to cover with the next coat.

Washing Painted Walls: One of the most effective ways to wash a painted wall clean is to use water and a sponge; add a little mild soap or linseed oil soap; put in a small amount of washing powder or sal soda and also a little flour and water paste. Brush this water on to the wall with a calcimine brush from the bottom upwards. Let it stand two or three minutes and then sponge it off with clear, warm water. The flour paste holds the soapy water on long enough to dissolve the dirt.

What some painters consider a better method is to make a strong glue-size (see Lesson 18). Add glue to hot water until the mixture is slightly sticky on the fingers when dipped in and allowed to dry. The glue must be soaked in water a while first. Brush this size on with a calcimine brush too; let it soak two or three minutes and then sponge off with clear, warm water. The glue picks up the dirt and prevents it from smearing around in streaks. A little sal soda is needed in water for very dirty places over radiators. A wall can be washed cleaner by these methods and in about half the time required by other ways.

Starch covered walls (see Lesson 19) should be washed with clear, warm water only, unless that fails to make them clean. Such a wall is usually washed without the intention of repainting. Often it is starched again. Great care must be used, therefore, to avoid injury to the paint coat. Sal soda or washing powders in the water kills the gloss of the paint.

Kitchen walls are apt to be greasy. A stronger glue-size and more soda or other alkali in the water are needed to wash them clean. A little vinegar or ammonia in the washing water sometimes helps. Bathroom walls, too, often are hard to wash because the steam drives the dirt into the paint.

Discolorations and Stains: Water, smoke, "bleeding" reds and other things in old buildings occasionally show stains on the plaster which come through and discolor the paint. Sometimes a few bricks in a wall have been used

as part of a chimney in other buildings and are saturated with creosote from smoke. This comes through and stains the plaster. Water from leaking roofs stains plaster walls, sometimes.

When certain red wall papers or water paints have been used on walls the wetting with water in removing them causes the red stain to "bleed" and stain the plaster. Some aniline reds are called "bleeding" reds, because they come through many coats of paint sometimes and turn the light colored paint pink.

Many treatments are used to seal up stains. They should be washed off of the plaster as much as possible first. Then sometimes one coating will stop the travel of the stain, sometimes another.

A coat or two of shellac; a coat or two of aluminum metal bronze paint; all of these are used on different occasions. One or the other of these coats is quite likely to succeed.

QUESTIONS ON LESSON 17

1. What shape should holes and cracks be made before filling? Why?
2. How is plaster of Paris putty made?
3. In filling holes and cracks with putty, why is it necessary to trowel or glaze the surface?
4. How can you fill and hide surface scratches?
5. How are fire cracks covered up?
6. What are the best ways to wash walls?
7. What materials are used to seal up stains on walls?

LESSON 18

WALL-SIZES

The decorating of walls a good many years ago did not include the use of wall-sizes. The surface was filled and levelled by using several coats of lead and oil. Unquestionably this was a good method, but in later years the house owner called for cheaper work and the painter found that with a coat of size to stop suction, one or two coats of paint could be omitted without noticeably injuring the appearance of the finished job.

The law of experience says, however, that you must not completely stop the suction of a surface immediately, by sealing up the pores air-tight right at the start of the job, so it may be completed with one more coat. It is not wise to seal up the pores by first coating the surface with gloss oil, hard oil, suction varnish, shellac or glue-

size. Such a foundation coat is treacherous. Often it stands for a while until repainted two or three times. Then the added weight of the new coats overcomes the ability of the sealing coat to hold and scaling results.

So, in nearly all cases the first coat on a surface should bo paint which enters the pores and anchors itself firmly. Then the size-coat can be put on to stop further suction.

Glue-Size: Although glue size has been used for many years to prevent suction and the sealing of fine fire cracks, we do not recommend its use generally. An extra coat of paint, even though more expensive, answers the same purpose and is undoubtedly the better treatment of a painted wall.

If glue-size is used it should be applied on walls after they have been painted one or two coats, but never directly on a plastered wall.

In preparing the glue-size the glue should first be soaked in water for two or three hours. After adding enough water to conceal it, boil same, being sure to prevent it from adhering to the bottom of the receptacle in which it is being boiled. In mixing the size add enough water to the glue so as to have it tacky or sticky in the fingers when they are dipped into it. Rather have your size too weak than too strong to prevent any possibility of the paint applied over it from scaling.

Varnish-Size: When you must do a job in less than three coats of paint, the best treatment is to lay on one coat of white lead, linseed oil and turpentine, or one coat of prepared flat wall paint thinned a little with boiled linseed oil as per Lesson 20, tinting it to suit. Then apply a coat of varnish-size made from first-class interior varnish thinned with turpentine and to which has been added enough of the paint mixed for the finishing coat to give color. The pigment gains a better anchorage than the varnish and turpentine alone can. It also causes the size to cover or hide the surface fairly well.

No varnish-size is suitable for sand-finish or rough walls.

In the mixing of varnish-size we do not mean gloss oil, suction varnish, sealing varnish or some of the cheap resin and benzine varnishes. Such materials are not usually satisfactory to put on painted surfaces. There are, however, some brands of wall size prepared by manufacturers which are excellent for certain purposes.

The gloss oil and similar sizes cause paint to remain

soft and tack indefinitely, sometimes, and to take on a disfigured, alligatored appearance. The resin sometimes works up through the paint and remains sticky. Neither wall paper nor canvas, muslin nor burlap will adhere to a wall coated with gloss oil size.

For hard, smooth plaster walls, wood fibre wall board and any hard, interior smooth surface, varnish-size certainly has many advantages. It is not affected by water, it dries quickly and hard, filling and leveling the surface, stopping suction and sealing up the pores. Such a size often accomplishes about as much in one painting as a coat of glue size and a coat of paint together. Varnish-size can be spread right on the plaster before painting, but it is much better to put it between coats of paint, as with glue-size.

Oil and Glue-Size: For rough-finish stucco, rough-cast and sand-finish walls only. This is a good size for stopping suction in new rough stucco or plaster walls to be painted. Mix as follows:

Dissolve good gelatin glue with hot water until you have a glue paste about as thick as paint. To three gallons of this hot paste add one gallon of linseed oil which is also hot. Add a little color to the oil to tint to the right color and a bar of laundry soap cut up into thin slices. Then stir until all the oil is taken up. Thin this with hot water to the right consistency for sizing, about as thick as linseed oil, a little thicker than glue-size. You will have about five gallons of size. Brush it on warm.

This size is practically water-proof and usually fills a new rough wall so a good job of painting can be done in two coats of paint. Put on next to the plaster or cement—not between coats of paint. Do not use for smooth, hard-finish walls.

Sugar-Size: A mixture of brown sugar and water. Add just enough sugar to warm water to make the water slightly sticky. Test it by dipping the fingers into the size and allowing them to dry.

This size is most often used on a wall which was sized with gloss oil and so will not permit wall paper, canvas, muslin and burlap to adhere to it. The wall is first coated with lead and turpentine tinted to suit. Then a coat of this sugar-size is brushed on and allowed to dry. Then paste for wall paper will firmly attach itself, also canvas and other wall coverings will stick to it.

QUESTIONS ON LESSON 18

1. Name the four principal kinds of wall-size.
2. Why should glue-size be made weak?
3. Is varnish-size suitable for sand-finish walls?
4. What purpose does size perform in painting?
5. Is a size coat needed when repainting old walls?

LESSON 19

THE BRUSHING OF WALL PAINTS

The best way to make this clear is to detail the painting of a wall. Whether the material to be used is a prepared flat wall paint, a white lead and turpentine paint or a white lead and flatting-oil paint, the method of brushing for best results is essentially the same. And no one can doubt the wisdom of learning this particular part of the trade well. Painting and decorating materials are used on so many different kinds of surfaces and under such widely varying conditions that it may almost be said that there is no average condition or job. Whenever peculiarities of material, surface or weather conditions develop, an expert in the use of the brush finds his skill usually brings success and gets him out of difficulties.

The brush action which results in the best appearing job, that which avoids laps, joints, brush-marks streaks, "shiners" as the gloss spots are called and "holidays" as the skipped or bare places are termed, is quite different than the brushing of paint on the exterior of a house.

Exterior house paint remains wet quite a while, it can be brushed over and touched-up usually some time after the stretch has been coated in and without detriment to the paint. But there is no quicker way to ruin the appearance of a flat coated wall than to handle the brushing that way or to spread out the material too much.

One of the first essentials in producing a finely finished, flat coated wall is that the light be good. It will not always be possible to have the light right, but when a choice can be made do the job when the sun is bright, especially the ceilings which are always the most difficult to handle from the viewpoint of brushing. Even in the best daylight one's eyes must be sharp and attention concentrated upon the task.

Paint mixed to dry flat is short in spread a few seconds after it has been spread on the wall. It sets quickly and gets sticky, so all spreading and finishing with the brush must be done immediately.

Mix your materials fairly thin and flow it on as you would enamel or varnish. Just as much thin paint ought to be laid on the surface as will "stay put" and show no runs or sagging of material. Thin paint flows together better than thick paint and that is what wipes out brush marks, laps and joints. Of course, if you mix it too thin it will not hide the surface and may run, sag and wrinkle.

Let us go through each step in the process of painting a wall, assuming for the purpose of illustration that the apprentice using the brush does not know a thing about it. Then details of the brush action needed for best results can be clearly stated in proper order.

Have the paint pot half full of paint. Work the brush, a 4 inch flat wall brush, well into the paint and wipe out as dry as possible on the inside edge of the pot. Then dip the brush into the paint about one inch only, slap it on the inside of the pot to remove surplus paint and you are ready to coat in the wall.

Begin brushing at the upper right hand corner, next to the picture mould. An up-and-down stroke is much better than side strokes and the up-stroke will lay more paint than the down-stroke. A lighter stroke is possible coming up, but the down-stroke is also necessary. Do not "ride" the brush by bearing down too hard on it. That will cause the paint to leak over the ferrule.

Start painting the first stretch about one foot wide and brush it down about the same distance. One dip of a brush will carry just about enough paint to cover that amount of surface as it should be covered. Coat this first area quickly and roughly, seeing only that all the surface is covered. Then with light strokes of the bristle ends lay the paint off smoothly to finish with up and down strokes.

Dip the brush again as before, brush the stretch down roughly first, one yard more and lay off the paint to finish with light, even strokes of the brush. Permit the light strokes only to run up over the joint between the first patch painted and the second.

Repeat this method of brushing to coat in one small area at a time downward until the baseboard is reached and this stretch about one yard wide is finished, taking care to lay off and join up each section smoothly with the one before it. Never go back beyond the last area coated in to smooth out joints, laps, streaks and brush marks. The paint has set. So to put your brush into it

lifts the sticky coat clear off the surface, leaving a bare spot, it only roughs up the paint already spread. Do not try to spread this set paint even a little more or the pigment will pile up on top of itself. Knowing this you can see the necessity for finishing each small area while the paint is wet and before you leave it. Flat coats flow together, level up and wipe out brush marks **only if left alone.** When brushed too long, or after setting, the natural flowing of the material is disturbed and the surface is disfigured. In fact, it is possible to brush some paints so much that the pigment will pile up and form a putty.

So do not play with the paint and do not worry it. Put it where you want it on the wall, lay it off smoothly to finish and let it strictly alone. Then it will take care of itself. A flat paint is flat because an excess of pigment is left on the surface. Brushing brings the oil to the surface and makes it glossy. Brush as little as possible.

Start the second stretch at the top of the wall one foot wide and bring down one foot at a time. Since the first paint spread was at the top of the first stretch, that portion has set most. So the second stretch had best be started at the top. Joining this second stretch to the first should be done in the same way as the one-foot areas are joined.

In laying off the paint, especially when joining small areas and the stretches together, with a light touch of the brush, **every stroke should be in a slightly semicircular manner up and down.** Straight strokes are taboo for smoothing and finishing.

Coming to a window opening it is necessary to coat in the space above the window frame and below it at the same time. That is, lay on one small area of paint at the top and then one at the bottom. See-saw back and forth that way to keep both edges wet until you get past the window, working to the left, and can again carry the stretches down completely from the moulding at the top to the baseboard below.

On ceilings if an edge of a stretch sets, on an unusually long ceiling, before you get back to join up the next stretch, use sort of a wiggle stroke of the brush and it will help you join up the two stretches well.

Lay the wet paint on next to the partly set stretch. With a light, semi-circular stroke lay it over the joint a little and then press the brush down fairly hard, nearly

flat on its side over the joint; pull and wiggle it at the same time, making wavy brush marks in the paint. Then lay off the paint again with light strokes as before to smooth up and finish. Do not take quite so wide a stretch next time across the ceiling.

A word about brushes, spattering and leaking. The best brush you can buy is an excellent investment for this work. Long, flexible bristles set in rubber, well trimmed and shaped, make a fine tool and a fine job. Use it carefully on odd jobs for a while to break it in, work out loose hairs and dust. Some brushes leak and most painters spatter some. Therefore, see to it that drop cloths are properly placed. A leaking brush is not to be understood, even by its maker; the best of them do it sometimes. Two first class brushes may be made identically alike but one may leak and the other will not. Leaking, more often however, is the result of putting too much paint in the brush or of not properly cleaning a brush, or of not cleaning out oil in which the brush has been stored.

The spattering painter can be understood, however. And if he will not correct the error of his ways, he should at least feel the necessity of working with a wiping cloth in one hand to remove paint spatters and the material spread on to the woodwork here and there where it is not wanted. The cutting of ragged edges, leaving the window glass and floors spotted with paint spatters, leaves a bad impression. By this means some painters have educated house owners to consider them a mussy lot.

Stippling Painted Walls: The process called stippling consists of simply pounding the wet finished coat gently and regularly all over the wall and ceiling with what looks like a large clothes brush. See Figure 11, Lesson 2. The stippling brush is about 3x6 inches and has long bristles. A new, clean duster will do for stippling small areas also. The object of stippling is to remove all brush marks and to produce a uniform looking surface having little pores all over it.

When a white lead painted wall is to be stippled, mix the last coat with half boiled linseed oil and half turpentine rather thick and add a little Japan drier. For a very rough finish add a handful of dry plaster of Paris to each gallon of paint. Most paints used on walls can be stippled, but some set too quickly for convenience in working. The paint should be thicker for stippling, usually than for finishing smoothly.

Because paint being stippled usually sets rather rapidly, it is necessary to work two men on a job, usually. One man brushes the paint on and the other follows closely with the stippling brush. In the painting use a flat wall brush, 4 or 4½ inch, apply a full coat of paint quickly, taking care to hide the surface without any effort, however, to avoid brush marks. Lay the paint off evenly. The stippler will distribute the paint evenly and his brush will take out the brush marks of your work.

Do not miss stippling any places and do not stipple the same place twice. Do not allow the edge of the stretch of paint to set before you get back to it with the next stretch.

Removing Gloss Spots on Walls: Sour milk is excellent for wiping over gloss spots which appear on finishing coats of walls when dry. Such spots result from too much brushing of the paint, from shellac coats under the paint and from other causes.

The milk contains enough acid to cut the gloss, and it is used by many decorators for that purpose, especially for touching-up gloss spots on a painted wall with a flat finish. No doubt the milk leaves a thin coating on the paint but it is transparent. The gloss spots will not reappear after this treatment. Some painters kill gloss spots on paint before the paint is dry, but after it has set, by lightly brushing on cold water to the spots. Others wipe over gloss spots when the paint is dry with a cloth having a little paraffin wax on it. The wax is first dissolved in turpentine. But too much wax on a wall will cause future coats of paint to scale off, if the wax is not removed with alcohol before painting. Starching the whole wall will remove gloss spots. Buttermilk brushed on to the whole wall is sometimes used in place of starch to protect the new paint from dirt.

Starching Painted Walls: The starching of painted walls protects them from smoke, dust and dirt. Then they are more easily and quickly washed clean than when not starched. Buttermilk is often brushed on to a wall for the same purpose. Both buttermilk and starch are transparent and you would not know they were on the wall by looking at it.

Starching walls gives them a more uniform appearance by taking off gloss from hard spots. It tones down high gloss surfaces also. It is cheap and a beneficial treatment which deserves wider use on moderate priced work.

Walls can be restarched after washing off the old starch coat.

For this work use ordinary laundry starch. Put a handful in a pail, add just enough cold water to dissolve all of the starch. Then pour boiling water on it until it thickens up to a jelly consistency and becomes clear. Next pour cold water in until the mixture is about as thick as milk. It is then ready to brush on the walls. The starch coat does not change the color of the wall. Sometimes, however, a pinch of dry color is put into the starch to tint it slightly like the wall color.

The above is the correct way to mix a starch coat. If only cold water is used the starch is not cooked and it turns to a white powder on the wall and dusts off.

When a starch coat creeps, crawls and will not stick to a wall having a gloss finish, wipe down the wall with benzine before starching. That is better than adding a bit of vinegar to the starch which is sometimes done.

Never starch a one-coat job of painting over a dark wall. The wall may look well covered and evenly brushed on, but the starch coat will show up any thin places and streaks. It emphasizes the laps and joints on such work. For two and three coat jobs, and especially on canvas or muslin covered walls which are well covered, starching is such a benefit and costs so little that few people would do without it if they knew its advantages.

QUESTIONS ON LESSON 19

1. How does the action of flat wall paints differ from that of outside house paints?
2. Can flat wall paint be brushed as much as other paints? Why?
3. What are "shiners," streaks, laps and joints?
4. How should your brush strokes be made? straight? crosswise?
5. What does stippling mean? Why is it done? Is the surface finished flat or glossy?
6. Why are walls starched? What kind of starch is used? Can it be seen on the walls?

LESSON 20

PAINTING A ROOM—THE WORKING METHOD

It will be presumed that all preparatory work on the walls and the sandpapering of the wood work has been done,—that both are ready to paint.

The first work on entering the room, then, is to thoroughly clean walls, ceiling, wood trim and floor, removing all dust and dirt as far as possible. Do this far enough in advance of the actual painting, if possible, to give the dust an hour or two to settle. Then you can wipe it off with your duster clean just ahead of your painting.

The next step is to spread drop-cloths which are large pieces of light weight canvas or heavy cotton sheeting of various sizes. They are made to protect the floor and furniture from paint and varnish spatters.

To reach the ceiling and walls, trestles (see Figure 30, Lesson 4) are placed, two to an ordinary small room, with a plank stretched between them. Working on this the ceiling can be reached. In large rooms four or more trestles and planks are set to accommodate several men. There are some places which can most conveniently be reached by using a step ladder.

The color scheme, it is presumed has been given to you. The mixing of paint and colors are presented in Lessons 11 and 12. The mixing formulae for quantities of materials are given below. The brushing of the paint was covered in Lesson 19.

Prepared Flat Wall Paints made of lithopone and zinc oxide are used extensively for wall painting. The packages contain directions for use.

When white lead is to be used the following formulae are suggested:

MIXING DIRECTIONS FOR PLASTER WALLS

First Coat—New Work

100 lbs. pure white lead.
7 gal. raw linseed oil.
1 gal. pure turpentine.
Makes about 11 gal. of white paint.

Size Coat—New Work

If a size coat is needed apply the size as per Lesson 18, using glue-size, varnish-size or oil-size.

Second Coat—New Work

100 lbs. pure white lead.
2 gal. pure raw linseed oil.
2 gal. pure turpentine.
1 pint Japan drier.
Makes about 6 gal. of white paint.

Finishing Coat—Flat New Work

100 lbs. pure white lead.
2½ gal. pure turpentine.
½ pint Japan drier.
Draw the oil out of the lead and zinc paste as directed in Lesson 11 for flat effects.
Makes about 5½ gal. of white paint.

Finishing Coat—New Work Egg-Shell Gloss

100 lbs. pure white lead.
1½ to 2 gal. pure turpentine.
¾ gal. white enamel varnish.
Makes 5 to 5½ gal. of white paint.

Finishing Coat—New Work Full Oil Gloss

100 lbs. pure white lead.
3 to 3½ gal. raw linseed oil.
1 pt. pure turpentine.
1 pint Japan drier.
Makes 6 to 6½ gal. of white paint.

OLD WORK ON PLASTER WALLS

Mix your paint as for new work, omitting the first coat and the size coat.

Coating-In the Walls: The first coat may be brushed on to the walls and ceiling to begin with. Then while this paint is drying spread the priming coat on the wood trim and when dry putty up the holes in this wood. (See Lesson 30, Chapter 7.)

The next step is usually the brushing on of the size-coat as per Lesson 18.

The order in which the various parts of the wood trim are painted with each coat is very important. You start with a clean duster, a clean paint brush, clean pot and the paint is strained. The wood to be painted has been sandpapered and cleaned, but in spite of care some dust will settle on the trim before you paint it, even in so short a time as an hour. You would use your duster, of course, to remove this dust immediately before you start spreading your paint.

Now here is the important point,—the doors and other large surfaces should be painted **first**, because they show up most in the finished job. The paint on these should be the smoothest and cleanest. It will be if you paint these parts first while your brush and paint and duster are clean. After you have painted the baseboards, mouldings and casings your brush has dragged more or less dust out of the corners and crevices in spite of your best efforts to make and keep everything clean. You see, then, that if doors and other large surfaces are painted last with dirty brush and dirty paint they are bound to look worse for it and to show up detrimentally. In very fine work it is customary to strain the paint and wash out brushes and duster several times. So, paint large

surfaces first when doing the wood trim, leaving mouldings, sash, baseboards and the like for the last painting. Keep a clean duster and a good one. Use it freely and intelligently. Then your work will reflect your thinking.

The second and third coats on wall, ceiling and trim are spread as were the first coats.

If starching or stippling are to be performed Lesson 19 describes these processes.

It is important that you work with the windows open during the sandpapering to avoid breathing dust too much; and during the painting with turpentine paint to avoid breathing turpentine fumes which are injurious to your kidneys. Likewise, alcohol and benzole fumes from shellac and varnish removers are injurious to health. So open all the outside windows, but close doors leading to other rooms if the family remains in the house while you are working. Paint smells are very distasteful to many folks not used to them.

On windy days care must be shown to avoid having your fresh paint or varnish ruined by dust blowing in from the street. There are days when the windows cannot be opened and when you cannot paint, but usually other work can be done then.

QUESTIONS ON LESSON 20

1. What is the first step necessary in painting a room?
2. What are drop cloths used for?
3. Are ladders used in more than one way?
4. In painting, varnishing or enameling.
5. What parts of the wood trim should be done first?
6. Why is ventilation necessary while you are at work inside?

LESSON 21

ENAMEL ON PLASTER WALLS

Painted plaster walls are often finished with a final coat of enamel when they have been coverd with canvas and also when they are finished in hard, smooth plaster. It is easy to wash them, then, and a high gloss or a dull satin finish can be produced as wanted. The working schedule for enamel work of this kind follows. Enamel work on wood will be covered in Chapter 6:

MIXING DIRECTIONS FOR ENAMEL ON PLASTER AND CANVAS WALLS

NEW PLASTER WALLS

If the plaster is very new, coat with a solution made of 10 parts of sulphate of zinc dissolved in 90 parts of water. This is to be brushed on and allowed to dry to neutralize the causticity of the fresh lime. Then it cannot cause discolorations or flat spots in the finished job.

First Coat

100 lbs. white lead.
7 gal. pure raw linseed oil.
1 gal. pure turpentine.
Color to suit.
Makes about 11 gal. of paint.

If the wall has been covered with canvass or other fabric the first coat should be modified as follows:
100 lbs. white lead.
4 gal. pure raw linseed oil.
2 gal. pure turpentine.
1 pint Japan drier.

Size Coat

If necessary apply one coat of size as per Lesson No. 18.

Second Coat

100 lbs. white lead.
1½ gal. raw linseed oil.
1½ gal. turpentine.
1 pint Japan drier.
Color to suit.
Makes about 6 gal. of paint.

Third Coat

100 lbs. pure white lead.
2½ gal. pure turpentine.
½ pint of Japan drier.
½ pint of varnish.
Color to suit.
Makes about 5½ gal. of paint.

Finishing Coat

Brush on a full coat of first-class enamel following the brushing method given in Lesson 19. If white is not wanted, color the enamel to suit by adding to it tinting colors ground-in-Japan,— not those ground in oil. Thin the Japan color with turpentine only, thoroughly mix and strain it before adding to the enamel, then mix it in thoroughly with the enamel.

In mixing this color use no more turpentine than is necessary to break up the color smoothly. Too much turpentine will thin the enamel too much.

A semi-flat enamel job is produced by using satin finish enamel-not a gloss enamel.

The second and third coats are to be sandpapered lightly with No. 00 paper. Clean up thoroughly after each sanding. Dust off the work before each coat.

Old Plaster Walls

Use the same method as for new work but omit First Coat and Size Coat. Begin with the third coat.

Enamel Over Flat Wall Paint

Another way to produce an enamel finish on plaster walls is to use two coats of prepared Flat Wall Paint followed by 1 coat made of ½ Flat Wall Paint and ½ high grade zinc enamel. Then apply one or two coats of zinc enamel.

QUESTIONS ON LESSON 21

1. Is enamel better than paint on kitchen and bath room walls? Why?
2. Must the enamel be white only? Must it be gloss only?
3. What preliminary treatment is advantageous for new plaster walls before enameling?
4. Can an old wall, previously painted with white lead or prepared flat wall paint, be refinished with enamel?
5. Why is it not wise to use linseed oil in all coats under the enamel?

LESSON 22

Hanging and Painting Canvas, Muslin and Burlap: Ideal, unquestionably, is the plaster wall covered with canvas or muslin and decorated in oil colors. Considered from the artistic, the sanitary and health, or the economical standpoint, such a surface has no superior.

Walls that have been patched repeatedly, poor jobs of plastering and surfaces full of settling cracks, or fire cracks may be covered with canvas or muslin and made good for a lifetime. Such a wall does not continue to chip, mar or scratch when the piano or furniture are accidentally pushed against it. It may be washed and redecorated at will.

Beyond a certain condition it is useless to try to patch up plaster walls. Cover them with muslin or canvas and it saves money in the long run. Fabrics may be put on to walls covered with wall paper, paint or calcimine, but, of course, the wallpaper is often removed and the calcimine washed off beforehand. Poor plaster walls are often covered with thick wallpaper, called lining paper, before a fabric is put.

On old walls the first operation is to fill up holes and cracks. Then sandpaper down any ridges and rough places. In fact, such walls should be as carefully repaired as for painting; wash them if they are covered with smoke and dirt. See Lesson 17, Chapter 5.

A wall that is quite porous should be sized to stop suction as per Lesson 18, Chapter 5.

A painted wall having a gloss finish should be washed first with warm water in which is dissolved a little washing soda to cut the gloss. Without such a wash on a high gloss surface, canvas and muslin often fail to adhere firmly to the surface. If the wall has been calcimined and coated with gloss oil, hard oil or suction varnish, no paper or cloth fabric covering will adhere to it. A coat of flat paint should be put on and also a sugar-size as per Lesson 18, Chapter 5.

Mixing the Paste: To mix the paste needed to fasten these fabrics to the wall, add two quarts of warm (not hot) water enough wheat or rye flour to make a thick paste. Put in about a tablespoonful of alum, powdered. Stir until all lumps disappear. Now put on the fire and add enough boiling water, a little at a time, to make the paste stiff. Add no more water, but beat up the paste

thoroughly and make sure no lumps are left. Stir until the paste is thoroughly boiled.

Dissolve one pound of good glue in two quarts of warm water and add this to the paste, mixing it thoroughly. Then strain the paste to remove any lumps. Many good decorators also add to the paste two tablespoonfuls of Venice turpentine. A little brown sugar or molasses improves the paste by making it more elastic, but they are not absolutely necessary, except where difficulty is experienced in making the fabric stick. The paste must be made thicker for fabrics than for wallpaper.

A test of the sticking quality of your paste is advisable. Take a piece of fabric about a foot square and stick it on the wall anywhere. When dry pull it off.

It is best to coat a wall with glue size as per Lesson 18 before pasting a fabric on to it.

From this point on either one of two methods may be followed in putting the fabric on to the wall. The first way is to cut off strips of the fabric an inch or so longer than the wall from ceiling to baseboard. Trim both edges with a sharp paperhanger's knife (See Figure 64), and a straightedge (See Figure 65).

When enough strips have been cut to cover one wall, measure the exact width of the first strip after it has been trimmed and mark a pencil line straight from ceiling to baseboard.

Next apply the paste freely to the first strip of fabric on the rough, unfilled side, brushing it out evenly. Fold the strip of fabric in the middle with the paste side in. Begin at the top of the wall to place the fabric strip on to follow the pencil mark down accurately, being careful not to stretch the wet fabric. Make the fabric stick to the wall by brushing it with a paperhanger's brush (See Figure 66) from top toward the bottom and from the center of the strip out to the edges. Smooth out all bumps and bubbles and be sure to have the edge follow the pencil mark closely. If this is done the fabric will smooth out without wrinkles. A chalk line can often be used advantageously on large walls to make the line first and then it can be followed with a pencil and straight edge.

On rough plaster walls a thin coat of paste ought to be brushed on to the wall as well as pasting the fabric strips.

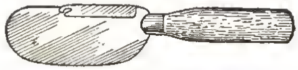


Fig. 64
Paperhanger's Knife

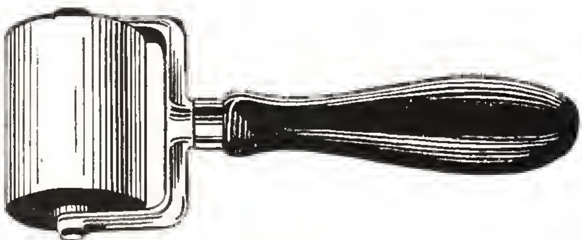


Fig. 67
Seam Roller

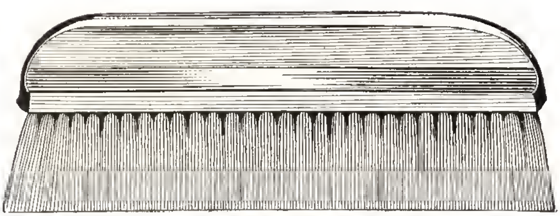


Fig. 66
Paperhanger's Smoothing Brush

Fig. 65
Straightedge

When the first strip has been made smooth, mark the pencil line on the wall for the edge of the second strip the correct distance from the edge of the first strip. The distance to place this pencil mark will of course vary according to the width of each strip of fabric after trimming. Next, coat the second strip of fabric with paste, put it on the wall in the same manner as the first, taking care to have it butt up to the edge of the first strip closely and to the pencil mark on the other side. The pencil mark is necessary with each strip, because the fabric stretches when it is wet with the paste. Force down the joined edges of the two strips of fabric with a seam roller —Figure 67.

When all strips of fabric have been pasted on to the wall, cut the tops and bottoms with the knife, as is done with wallpaper, and wash off any superfluous paste with a sponge and clear water. Wrinkles that may occur can be worked out while the paste is wet. Use a wet sponge to do this, also a smoothing brush.

Loose threads that may ravel out should be cut off when the paste is dry. Seams that are open ought to be filled with putty made by adding a small amount of dry whiting to white lead-in-oil paste and Japan drier or a little rubbing varnish. Very small openings and other defects may be filled with lead alone as it comes from the keg, using a spatula or flexible putty knife to smooth up the surface.

A careful examination of the fabric when dry will usually reveal more or less of this fixing up which is worthwhile, as it mars the appearance of an otherwise perfect job.

When the fabric put on is to be painted (sometimes it is stained by the manufacturer beforehand), some decorators butt the edges only fairly well and then fill in between the edges with white lead just as it comes from the keg. A spatula or putty knife will do the filling nicely. When well done the filling conceals the seam absolutely. Swedish putty is sometimes used for this purpose also, but it is more trouble to prepare it and it does not work any better than the lead paste. Swedish putty is made by mixing together a little white lead paste, the paste, whiting and Japan drier to form a putty. Putty in fairly large seams should be stippled with a brush to make them rough.

The second method of applying the fabric is the same

as the first, except that no pencil marks are necessary on the wall and the strips of fabric are not trimmed on the edges. They are simply cut the proper length, a little too long and then they are pasted as above described. When the first strip is in place, paste up the second and in putting it on the wall **let the edge lap over the edge of the first strip about one inch.**

When the second strip has been pasted down and smoothed out, place a straightedge over the lapped edges so it is about one-half inch from the edge of the second strip. Then with a sharp knife cut down through both the first end second strips of fabric, letting the knife follow the straightedge. Remove the straightedge, open up the seam to remove the strip cut from the edge of the first strip and then paste down both edges again. In this way you have a perfectly butted seam. See Figure 68.

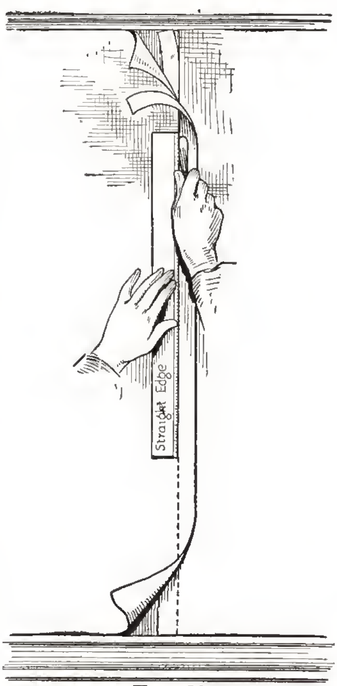


Fig. 68

Some fabrics which are unfilled, shrink excessively. It is then necessary to lap the edges as mentioned above, but do not cut or paste them down. Let the whole wall dry. Then wet the edges again with paste and trim by cutting through both edges as above. Paste down both edges and no more shrinking will occur. Seams that pull apart when dry may be filled with putty or lead as mentioned above.

Filling Fabrics: Prepared wall fabrics usually come already filled but decorators often use ordinary muslin sheeting unfilled for this work. The painting of unfilled fabrics differs but little from the work on filled fabrics, except that it requires more paint, which usually means more coats. Unfilled **burlap** and coarse weave canvas ought to be filled with the following mixture put on with a brush and given plenty of time to dry:

2 lbs. good glue.

15 lbs. fine gilder's whiting, bolted.

Use enough water to make a 5 gallon mix.

Dissolve the glue in a gallon of hot water; add the dry whiting to the glue and water a little at a time; stir and beat up the lumps, then add the balanee of the five gallons of water. When the filler is dry, coat the wall with boiled linseed oil.

The fabric should be pasted to the wall **before** this filling is done.

Unfilled **muslin** may be filled with this mixture:

12½ lbs. white lead-in-oil.

10 lbs. dry gilder's bolted whiting.

½ pt. Japan drier.

1½ to 2 gal. boiled linseed oil.

Thin this mixture with turpentine only enough to permit spreading it on to the fabrie smoothly with a brush. This filling should be done **after** the fabrie has been pasted on to the wall.

Often the only filling treatment given to unfilled fabrics is the applieation of a eoat of glue-size. This size ean be made a little stronger than for use on plaster walls as deseribed in Lesson 18, Chapter 5. This size is spread on as soon as the fabric has been pasted on to the wall and before it has beeome dry. When the size eoat is thoroughly dry, a coat of white lead tinted to suit and thinned with half boiled linseed oil and one-half turpentine is put on.

On prepared fabrics whieh have been filled by the manufaeturers the above mentioned filling eoats are usually omitted. It is sometimes desired that the fabric texture, the threads and weave pattern be allowed to show quite prominently. Then the filling is a disadvantage. Only the painted eoats are needed.

After the filling of fabries deseribed above by either the painter or the manufaeturer, the painting or enamelling should be aecomplished in the same way as on plaster walls. See Lessons 11 and 12, Chapter 4; also Lessons 20 and 21, Chapter 5.

Repairing Ceiling Canvas and Muslin. On some eeilings the old fabrie will have pulled loose from the plaster here and there. It must be pasted back before the painting proeeeds. Often the loose patches are only a foot or so in diameter and not near a seam.

One way to repair such plaees is illustrated by Figure

69. Take a sharp knife and cut through the canvas across the middle of the loose patch. Then cut it half way across the other way; that is, right angle to the first cut to form a "T." With the patch cut open in this manner you can easily work in your fresh paste under all of the loose portion with a small brush. Then the whole patch can be brushed back firmly into place, making a neat job. When the patch has become dry,

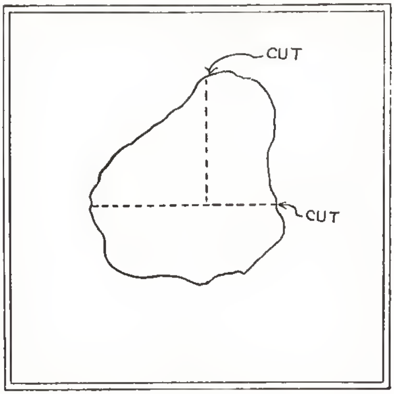


FIG. 69

fill the cut seams with white lead paste just as it comes from the keg. A few drops of any varnish or Japan drier will make this putty stick and dry harder, although the lead alone is sufficient. A putty knife is usually the tool used to fill these seams with putty. As a rule the paint coats will completely hide these seams. If they are quite prominent, however, it is well to coat them once or twice with lead thinned only with turpentine to a thick coat before the ceiling is painted all over.

QUESTIONS ON LESSON 22

1. What advantages are gained by using a wall fabric?
2. Is it safe to place a wall fabric on to a wall coated with gloss oil? Will it adhere to such a surface without special treatment?
3. Is it necessary to trim the edges of wall fabrics?
4. Are wall fabrics filled when you receive them?
5. What is a straight edge? A seam roller?
6. Can you put wall fabrics on a rough plaster wall—on a wall board wall?

LESSON 23

Painting Wall Board: The decoration of wall board offers no particular problem for the decorator, in fact, the different brands of wall board provide the nicest kind of a surface to paint.

Wall board is made with a surface closely covered with very small pores. This is done to produce the effect, possibly, of canvas covered or stippled plastered walls.

This porous surface makes two things necessary from the decorative standpoint. First, that it be sized to stop suction, and second, that the paint used shall be made of a very fine pigment and that it be mixed as thin as will cover and hide the surface well without filling up the pores level.

Some brands of wall board are sized at the factory. Unsized wall board should be given a coat of varnish size—good interior varnish thinned with turpentine. Glue-size cannot be recommended for this purpose. By adding to the varnish-size a small amount of the paint to be used, it will often answer the purpose of a coat of paint. This varnish-size coat should be given plenty of time to dry. It should be mixed quite thin to seal up the pores and stop suction, rather than to hide the surface.

The sized wall board may be decorated in as many ways as plaster walls. It may be given one or two coats of white lead paint mixed as per Lessons 11 and 12, Chapter 4, and Lessons 20 and 21, Chapter 5. Or it may be decorated with one of the flat wall paints prepared by manufacturers.

Decorating Radiators: A radiator is not exactly a thing of beauty, but in the northern states it is a necessary nuisance. Radiator manufacturers have recognized this fact and are now making styles that fit under windows or built-in seats where they are not conspicuous.

The decorator can do a great deal more to make this useful part of the house attractive and less conspicuous than is often the case. He can with little trouble do better than use the monotonous aluminum bronze. One simple way is to mix together gold bronze and aluminum bronze in varying proportions, or use copper bronze mixed with aluminum. The modern and efficient way of painting radiators is to use the same flat wall paint as used on the wall. White and light tints give the maximum radiation effects.

When you want to turn out a really fine piece of work, clean off the rust and prime with red lead thinned with about one-third linseed oil and two-thirds turpentine; put in a little lamp black to tone down the bright red lead color and then it can be covered more easily with the second coat. Next apply your coat of bronze of whatever color you choose—copper, gold, aluminum, green, blue, lemon, orange, crimson or a mixture of any of them as a ground coat for glazing and wiping out. Mix the

bronze with the ordinary bronzing liquid. When dry, brush on a thin coat of any oil tinting color which is transparent;—let it be Van Dyke brown, Prussian or cobalt blue, chrome green, orange chrome, Dutch pink, rose lake, raw or burnt umber, raw or burnt sienna. In fact, any glazing color that will harmonize with the bronze color and the color of the walls and furnishings.

The glazing color is to be made very thin with one part turpentine, one part benzine and two parts raw linseed oil. Use a brush to spread this glazing liquid and color. The color is not supposed to hide the surface; the ground color is to predominate with a thin sheen of glazing color over it.

Brush on the glazing color, let it stand to dry a minute or so and then, if you wish, wipe off the high spots of the ornamental work with a wad of cheese cloth, leaving the color in the crevices and depressions. Sometimes the glazing color is put on evenly all over the radiator and sometimes only on the ornamental designs at the top and bottom.

After the glazing color has been brushed on, it is well to stipple it with a regular wall stippling brush or to use a large wad of cheese cloth to stipple with.

The brighter colored bronzes are used only for novelty effects in public buildings where something bizarre is wanted, but mixtures of the bright and dull colors give wonderfully attractive dull toned ground colors. Some pretty combinations are: dark chrome green over copper bronze; Van Dyke brown glaze color over copper bronze; burnt umber glaze color over gold bronze; raw sienna glaze color over aluminum and gold bronze mixed for the ground coat.

Radiators can be decorated, if not so brilliantly, just as harmoniously, by painting over the red lead primer with white flat tinted ivory white, light gray or most any light color; and then use one of the glaze colors mentioned above. The glaze color should be stippled, also, with a brush or a wad of cheese cloth. The lead ground color should be mixed to dry flat, using only turpentine as a thinner. Rub down all ground coats lightly to make them smooth, using steel wool for the purpose. For bright colors and black use colors ground in Japan and thinned only with turpentine over the red lead ground coat. Then glaze over them with the above mentioned transparent oil colors the same as for bronze grounds.

Radiators to be enameled in light colors without the mottled glaze effect—just plain solid colors and white—are first primed with red lead as described above, or with one of the heat resisting paints prepared by manufacturers.

Over this coat two coats of lead, tinted or white, and thinned only with turpentine should be put on. Next a first class enamel, white or tinted with Japan colors is to be put on. No white enamel will remain white for a long time on radiators; it will turn yellow. But if the heat is admitted to the radiators moderately for the first few days it will preserve the enamel greatly by gradually baking it. If the radiators are permitted to get too hot at first it will cause the enamel to sweat. White baking enamels are best for this work.

Bronze paint reduces the heating effects of a radiator about one-fourth as compared to lead paints, Japans or enamels. In tests at the University of Michigan it was found that, in comparing the heating effects of radiators not painted and those painted with bronze paints, lead paint, Japans and enamel, the radiators not painted and those painted with lead paint, Japan and enamel had about the same heating effect; but the radiators covered with bronze and aluminum paints had about 25% less heating effeet. The bronze and aluminum paints reduced the amount of heat that the radiator could give off.

It was found that if the last coat was white zinc paint, greatest heating efficiency was obtained.

If a radiator covered with bronze paint is not heating a room sufficiently, covering with zinc, lithopone, flat wall paint or enamel will increase its heating effect one-fourth to one-third, or will be equivalent to increasing the heating surface by that amount; it will make three radiators give off about as much heat as four radiators covered with bronze or aluminum.

QUESTIONS ON LESSON 23

1. What kind of paint ean be used on wall board?
2. Is glue size good for wall board painting?
3. Are gold and aluminum bronzes the best colors to use?
4. What is a glazing eolor?
5. Is it possible to enamel radiators?
6. What effeet has painting on the radiation of heat?

CHAPTER 6

Calcimine and Calcimining

LESSON 24

This method of deeorating interior walls and eeilings is extensively used. The present-day materials and methods have evolved from the early eustom of using whitewash, no doubt, and the later distemper paints used in fresco deeorating. At first only ceilings were ealcimined, while the side walls were painted in oil paint or were wall papered. In the beginning, also, the jobs were usually white. Then colors came gradually into use.

There are three kinds of ealeimine in use today: The kind the painter mixes himself; that prepared by manufaeturers ealled eold-water ealeimine; that prepared by manufaeturers ealled hot-water caleimine. All three kinds are substantially the same in eomposition, though there are some differenees.

The hot water caleimine must be mixed with boiling hot water. For that reason it is not so popular now as at one time. Hot water eannot always be conveniently found. Much time is eonsumed, often, in providing it in new buildings. This ealcimine must be allowed to eool off after mixing and before it can be used. That runs up the time and labor eost on the job.

Cold water caleimine is quite generally used now, beeause of the time saved in preparing it for use. It should not be mixed with really eold water, however, for best results. Water with the ehill taken off, or luke warm water gives the most satisfaetory results.

Calcimine Pigments: Today dry whiting is used almost entirely as the base. Years ago dry zine was used some on fine work. Various grades of whiting are listed by supply houses:—"Gilders," "Extra Gilders," "XXXX Gilders," "Cliffstone or English." In form whiting comes in dry lumps and also bolted. The later term—"bolted"—means that the lumps have been erushed and the whiting has been sifted through fine silk bolting cloth to a very fine, dry powder.

For mixing calcimine the fine grades of whiting are

needed—those designated as "Extra Gilders" and "XXXX Gilders" are commonly used. The coarser grades make calcimine which does not hide the surface well.

Calcimine Binders: White glue is used mostly to bind the calcimine pigments together and to the surface. It comes in flake and also in coarsely ground form.

In the calcimines prepared by manufacturers casein and other materials are used as well as glue as binders.

Calcimine Colors: The colors used to tint the whiting base pigment are practically the same as are used for oil paints, but they are used in dry form, or are what are called distemper colors. Distemper colors are those ground in glue and water to paste form. These colors, however, are used more now for graining. They were much used twenty to thirty years ago for fresco painting. This fresco work is a form of water color painting for ornamental work. It is now quite out of style.

Following are the dry colors commonly used for tinting calcimine which is mixed by the painter:

BLACKS

Lamp Black
Ivory Black
Drop Black

BLUES

Cobal Blue
Azure Blue
Ultramarine
Prussian
Celestial

GREENS

Lime Proof Green
Paris Green
Light Chrome
Medium Chrome
Dark Chrome
Forest Green
Emerald Green
Bronze Green
Verdigris Green
Malachite Green

YELLOWS

Canary Chrome Yellow
Medium Chrome Yellow
Orange Chrome Yellow
Dutch Pink
Yellow Ochre

BROWNS

Van Dyke Brown
Burnt Turkey Umber
Raw Turkey Umber
Raw Sienna
Burnt Sienna

REDS

Tuscan Red
Indian Red
Permanent Red
Rose Pink
English Vermilion
American Vermilion
Venetian Red

LESSON 25

Mixing Calcimines: The calcimines prepared by manufacturers should be mixed according to directions given by the manufacturers on the packages. They contain all necessary glue or other binders. It is necessary only to add the water.

The calcimine should be mixed in galvanized pails—not wood. Wood pails absorb the glue and decomposition may occur in summer. Have clean pails and brushes.

Not many painters mix their own calcimine today, but it is well to know how. Then a better understanding of the work is gained and, since no two surfaces are alike as to temperature, color, texture and suction, more or less adjusting or tempering of the calcimine is necessary to fit the job at hand.

The dry whiting should be put in a tub or metal pail and covered with cold water to soak over night if possible. Then the mass should be thoroughly stirred until smoothly broken up. The dry color to be used for tinting ought to be soaked in cold water also.

The white glue should be soaked in cold water to reduce it to soft jelly consistency. About one and one-half ounces of good glue are needed to each pound of dry whiting and color used. The best quality of glue used sparingly is much better than a larger amount of cheap glue.

After the glue has soaked in water over night, pour off the excess water and add enough boiling hot water to thin the glue jelly so it will pour. If it is much stronger than that which is of the consistency of a trembling jelly, there is danger of the colors showing up shiny when dry. If the glue is too weak, there is likelihood that it will not bind the colors sufficiently to prevent the calcimine from dusting off.

Mixed glue takes on an unpleasant odor if kept any length of time. It is advisable to mix it fresh each day. A few drops of carbolic acid or oil of cloves will retard fermentation.

Before the glue is added to the whiting, the dry color should be mixed in with the whiting which has already been soaked until the desired tint is secured. Remember that this dry mixture looks different than when it is wet; and again it is different in color after the glue is added and when it becomes dry on the wall. Test your color by mixing up an ounce or so with the glue, spreading it onto a piece of paper or wood and holding it over a stove, lamp or anything which will dry it quickly.

After the whiting and dry color have been mixed to get the exact tint wanted, add the glue binder boiling hot (it has been thinned with hot water). Mix the glue into the dry pigment thoroughly, adding only enough hot

water to thin the mix fairly well. When it beeomes necessary to mix a dry pigment and a liquid by hand it is usually best to add the dry pigment, a little at a time, to the total amount of liquid, stirring all the while. This is better than adding a little liquid to the whole amount of dry pigment. The latter method causes lumps of pigment to form at first; then they swim around in the batch and are hard to break up with the paddle.

Caleimine coats must be mixed quite thick. It is better to hide the surfaee completely in one thick coat than in two thin ones. You want to pile as much pigment on to the surface in one coat as is neeessary to hide it and yet avoid brush marks, laps and joints which disfigure the finished job. (Note that the object in view while brushing on calcimine is directly the reverse of that necessary for good results in spreading oil paints on exterior surfaces.) About the only way to tell how thin to mix your calcimine is to try it out by brushing a little on the surfaee and noting its hiding and brushing ability.

LESSON 26

Brushing Calcimine: The kind of brushes used for calcimine work are illustrated and described in Lesson 2, Chapter 2.

Before commeneing to brush on calcimine see that the wall surface is ready, that the room has as much light as possible and that proper scaffolding is in plaee to work from.

In eommencing to apply the ealeimine on a ceiling, the start should be made at a corner and the operator should work away from the light. This is a simple fact, but most important as will soon be apparent by the ease with which the work can be seen as it progresses.

The ealcimine brush should be dipped pretty well into the calcimine, from two to three inches, so as to carry as much material to the surfaee as possible without spattering it about the room or having it run down the brush handle. Brush out the caleimine evenly, using mainly the tips of the brush; lay on a few quick, straight strokes, then erisscross them, keeping the edges of the stretch wet so that the laps will not show. Much of the skill described in Lesson 19, Chapter 5, for brushing on flat wall paints is needed in the brushing on of calcimine.

When working on a ceiling, take a narrow strip across—some experts say from twelve to eighteen inches

wide. Let this stretch reach from one side wall to the other before beginning a new one. It is possible to take a wider stretch and carry it successfully across a ceiling, depending upon your experience, ventilation, temperature and the calcimine mix. When uncertain, it is best to take a narrow stretch across, as it is important to avoid having the laps and joint show as they will if too wide a stretch is carried across and the edge becomes dry before the next stretch is brought along to join up with it. In cool weather and when the room and walls are just right for calcimining, a very wide stretch can sometimes be taken across a ceiling, if the room is not too large. In case an edge of a stretch should dry so that the next stretch shows a lap, brush on clear water lightly and very deftly so as not to lift the calcimine off on your brush. Use a clean brush and put the water on the dry edge **before** you stretch on the next stretch of calcimine to join up with it. If this is done the lap will not show.

Having completed the first stretch, return to the point of beginning and start the next strip, lapping the previous strip well and working the color into it, gently brushing the lap part with the tips of the brush. Do not put more calcimine on the lap than elsewhere. The whole surface should be as uniformly covered as possible; that is, the same thickness of film of calcimine should be spread on the whole area. A good eyesight is necessary to get good workmanship because one must guard constantly against what are called "catspaws," "holidays," "misses," etc.

When calcimining walls, starting at a corner and working away from the light is the proper procedure. Begin at the top of a wall in a corner and take no wider stretch down than will insure wet edges. It is safer to take wide stretches on side walls than on ceilings because ceilings are usually hot even in cold rooms. Then it is easier to avoid laps and joints on side walls because the large spaces are broken up with doors and windows.

Once the calcimine is on, the important thing is to see that it dries quickly. It should be given all the air it can, for the quicker it dries the better the result. Slowly drying calcimine is apt to turn out spotted. When the weather is wet or the room damp from other causes, a little heat in the room is desirable. While the calcimine is being brushed on drafts must be avoided, because they make the stretches set too quickly, but as soon as the walls are all coated in, the windows and doors should be

opened wide. Weather conditions have a good deal to do with a good job of calcimining. So when it is possible to calcimine at your own time, choose a day when it is not too warm and when all conditions are favorable for quick drying.

LESSON 27

Calcimining New Walls: The prime essential to success in producing a first-class job of calcimining is that you first produce a plaster surface which is uniform all over. Some new walls are uniform, but most of them are not. In places there are soft spots where the plaster was not trowelled as much as in others by the plasterers. Then there are other spots which are glazed very hard by excessive trowelling. The mixing and the composition of the plaster also influence the nature of the surface and its inequalities. The soft spots absorb liquids excessively, of course, while the hard spots hold liquids on the surface too much.

Another inequality of new plaster surfaces is that in some there are hot spots, so-called;—places where there is an accumulation of quick lime, due to insufficient mixing of the plaster. These hot spots discolor decorative coats because the hot lime reacts on the tinting colors in the calcimine or paint.

Still another difference in surfaces exist. Some are very smooth and others are quite rough, even though intended to be smooth all over. Then there are rough sand finish and cement stucco finishes of different degrees of roughness.

It is easier to cover and hide a rough surface than a very smooth one. This because the rough projections on such a surface catch and hold the calcimine or paint particles in greater quantity (thickness) on the surface.

With some walls it is possible to brush the calcimine directly on to the surface without any preliminary treatment. Not the best practice, but sometimes necessary to save expense.

The suction on most new walls is so unequal and there are so many rough places, that it is necessary to brush on first a coat of gloss oil, hard oil or suction varnish thinned a little with benzine. This size coat should be thick enough, however, to dry with a good gloss. Over this the calcimine is spread easily to make an evenly colored job.

Gloss oil or other sizing varnish should be used only if the walls are dry. If wet, a glue-size is better.

When walls have a glass-like smoothness and are difficult to hide and cover with one coat of calcimine, it is customary to add a little dry plaster of Paris to the gloss oil (about a handful to a gallon). This makes a surface slightly rough—with a "tooth," as the painters call it.

Glue-size made as described in Lesson 18, Chapter 5, is used in place of gloss oil by some painters and it is just as satisfactory for some surfaces. It is better for damp walls. Calcimine is spread over the glue-size as soon as it is dry.

The very best job of calcimining results only when the new wall is first given a coat of paint, followed by the calcimine. The paint may be mixed as described in Lessons 11 and 20 to dry flat, or semi-flat, if the surface appears quite porous. It should be colored the same or lighter than the finished calcimine is to be. A ready prepared flat wall paint may be used also for this purpose.

Most calcimine jobs are successful with one coat of this material, but when one thick coat does not hide the surface and make a uniformly colored surface, it is sometimes necessary to put on a second coat mixed thin. It must be very skillfully brushed on to avoid lifting the first coat up on the brush. If the first coat is not strongly bound with glue, it may be picked up by the brush easily on going over it with a second coat. That condition can often be overcome by brushing on a water coat (in which a little alum has been dissolved) just ahead of the second calcimine coat. If this fails, the only remedy is to wash off both coats and put on another coat which is thick enough to hide the surface in one coat.

LESSON 28

Calcimining Old Walls: If the surface has been calcimined before, it is usually necessary to wash off all the old calcimine. A pail of warm water and a good sponge are all that are needed to do this. Wet a patch of the wall first to loosen up the calcimine, wring out the sponge and wipe off the calcimine. Dip the sponge again in water to take off the calcimine accumulated on it and continue the washing.

If the wall was coated with gloss oil, hard oil or suction varnish before, it will not be necessary to do it again. Spread your new calcimine coat on right over it. In

some cases it is necessary to put on a coat of glue-size (see Lesson 18) before spreading the calcimine.

When the surface has been painted before and is now to be calcimined, it is usually necessary to wash off the dust and greasy smoke before the calcimine is put on. Use warm water with a little soda or washing powder in it to cut any gloss on the surface and the grease. It is sometimes advisable to spread a coat of glue-size on to such a wall before the calcimine if the paint is not in good condition.

A quick, cheap job—"topping over," as the painters call it—is sometimes done over old calcimine without first washing off the old coat and without using gloss oil or other size. This is possible only when the old calcimine is not too dirty and when it has a glue or other binder which is strong. Otherwise the brush will lift off the old calcimine while spreading the new. Spreading water ahead of the calcimine may prevent this. In this kind of a job the new calcimine must be about the same color as the old, at least darker. If the wall is quite dirty, the new coat will simply smear the dirt around and leave a streaky wall.

It is not wise to attempt this kind of cheap work unless forced to. The method often fails. Then it would have been better to have put on a coat of size in the first place and to have washed off the old calcimine.

Stippling Calcimine: It is possible to stipple calcimine (see Lesson 19, Chapter 5). This is commonly done in some sections of the country. It takes two men, one to brush on the calcimine and one to stipple it. In fact, it takes two good men to stipple as fast as one fast brush hand can spread on the calcimine.

Repairing Plaster Walls for Calcimining. See Lesson 17, Chapter 5.

QUESTIONS ON CHAPTER 6

1. What are the materials used in the mixing of calcimine?—pigments?—colors?—liquids?—binders?
2. When should the glue be added to the calcimine?
3. What kind of a brush is needed in this work? Why is not a four-inch wall brush just as useful?
4. How many coats of calcimine are usually put on?
5. Is it practical to use calcimine on brick?—on cement?
6. On what part of the room do you begin to calcimine?
7. Is there any advantage in having calcimine dry quickly? How can you hasten the drying?
8. Is calcimine ever mixed to dry with a gloss?
9. When is gloss oil size best?—when is glue-size satisfactory?
10. Is it possible to stipple calcimine?

CHAPTER 7

Interior Wood Finishing

LESSON 29

Characteristics of Common Woods. A fairly complete knowledge of these is essential. Before a painter can reasonably expect to paint, enamel, stain, fill and varnish new wood surfaces to make the most of their natural beauty, and to finish them serviceably when the grain and figure are covered up, he should be able to distinguish one wood from another by its structure, color and hardness.

First hand knowledge of various common woods is most easily and accurately secured by a study of unfinished panels of the woods themselves, first; then a study of the same woods finished in various ways should be made. The illustrations here shown with their descriptions will help to inform you on the subject.

It should be kept in mind that the wood from most trees presents a different grain figure when quarter-sawed than when straight sawed. In oak the difference is, perhaps, most marked, although hard pine flooring exhibits very noticeable differences. Straight sawed yellow pine has the very large, irregular, flat grain figures, while the edge grain pine shows principally straight streaks of alternating light and dark wood.

White Pine: Only a few years ago this wood was the chief lumber used for exterior construction of buildings in the United States. Many thousands of the older houses you are called upon to paint today are constructed of white pine. The supply of this fine lumber has diminished now to the point where it can no longer be used to any great extent for exterior construction. Some interior trim, sash and doors are still made of this wood.

White pine is very strong, elastic, light in weight and its working qualities are unsurpassed from the carpenter's viewpoint. It is a soft, close grained wood which seasons easily with but little shrinkage. It absorbs paint readily and permits it to secure a good anchorage. The even, uniform grain of white pine makes it easy to cover

and hide with paint. Not many sap or pitch pockets are to be found, but over them the paint will dry more slowly.

The grain and figure of white pine are not interesting. It is not used for interior trim where a stained or natural finish is wanted, but is an exceptionally fine base for enamel and painted finishes. It does not often have the sap streaks found in other woods which discolor white enamel and paint.

Hard Pine: This wood is also called yellow pine, long-leaf pine, short leaf pine, Georgia pine, Southern pine, Norway pine, and pitch pine. It is named according to the locality in which it grows. All varieties are of a similar character for the purpose of painting, although there are some technical differences between them.

This pine is hard, heavy in weight, tough, strong and, while it is coarse grained in fact, it is also of a compact nature because between the wood fibres is filled solid with resin or pitch. In color it is a deep red in the sap streaks and generally yellow all over. The sapwood, which is the outside or first cut from the log, is very light yellow, while the heartwood (the inside or middle cuts from the log) of the tree is an orange color. The sapwood is quite soft, open grained and it absorbs paint quite readily. The heartwood, on the other hand, is so saturated with the resinous gum that it absorbs little or no paint. The latter kind of hard pine is a most treacherous surface to paint;—this because the paint cannot penetrate enough to anchor itself, so it scales off.

Hard pine is a difficult wood to season;—the pitch in it prevents the loss of moisture to a large extent.

It is not unusual to find a building constructed with many different varieties of this pine; some boards are very soft, light colored and will absorb the paint, others around it are very dark colored and quite full of sap.

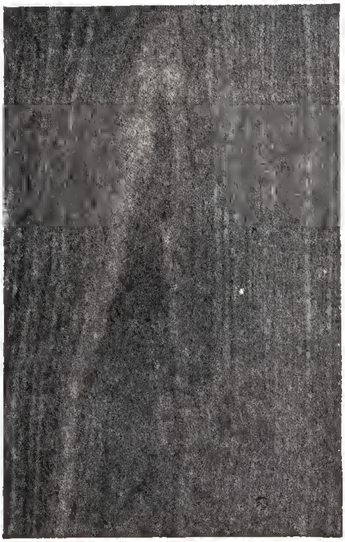
In painting buildings with such varied kinds of lumber in them, experience shows that more satisfactory results come from the use of thin coats well brushed out and carrying more turpentine than usual, especially more turpentine in the priming coat. Thick paint coats rich in oil ought not to be put on to such wood.

The very dark colored hard pine is difficult to hide and cover with paint rich in oil. Paint thinned largely with turpentine carries a larger amount of pigment and it more easily hides dark boards.

Figured Birch—Rotary Cut

PLAIN SAWED BIRCH

BIRCH BURL



PLAIN SAWED WHITE ASH

ASH CROTCH

QUARTER SAWED OAK

STRAIGHT SAWED OAK

PLAIN SAWED BUTTERNUT

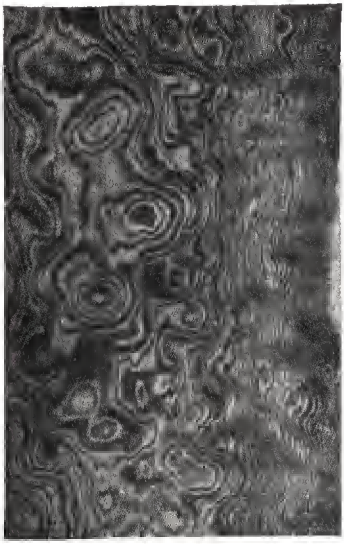
PLAIN SAWED CHESTNUT

NATURAL CYPRESS GRAIN

CURLY CYPRESS

DOUGLAS FIR

STRAIGHT GRAINED MAPLE

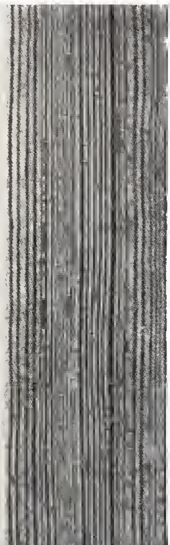


Curly Long Leaf Pine

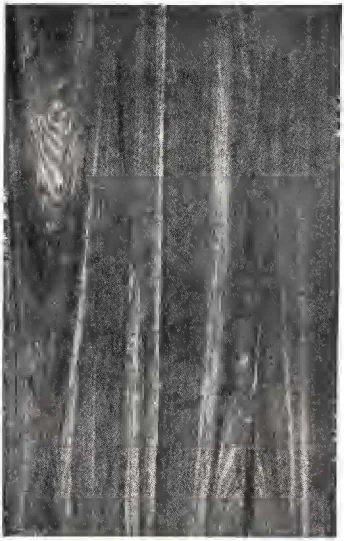
Straight Grain Hard Pine

Straight Grain Soft Pine

Curly Pine



Edge Grain Soft Pine

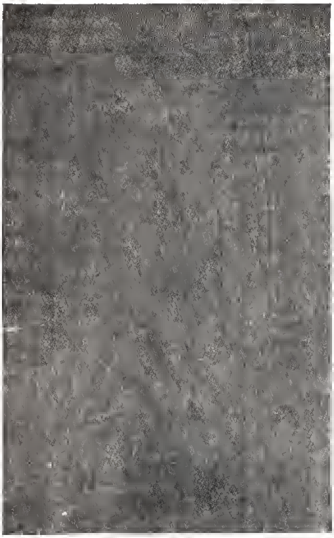


Plain Red Gum

Quarter Sawed Red Gum

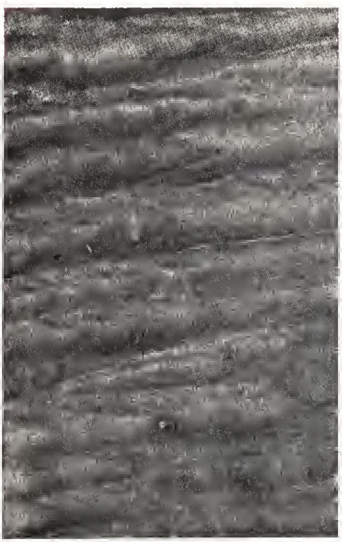
Selected Figured Red Gum

Rotary Cut Red Gum

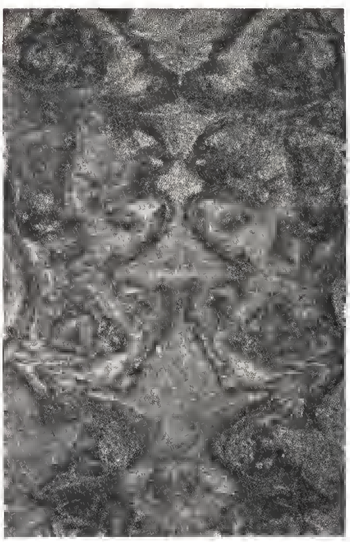


American Black Walnut

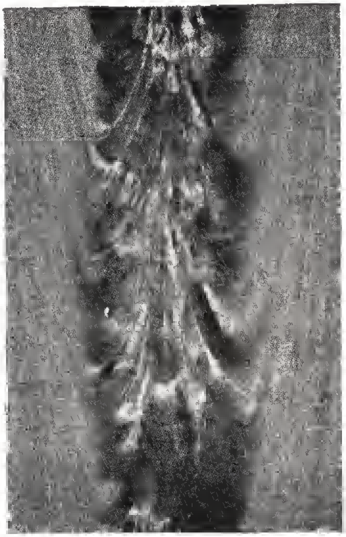
Straight Grained Circassian Walnut



Curly Grained Black Walnut

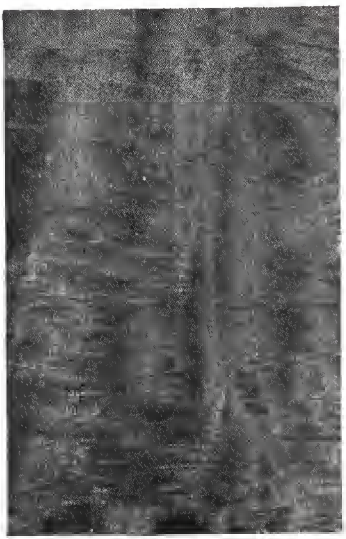


Circassian Walnut



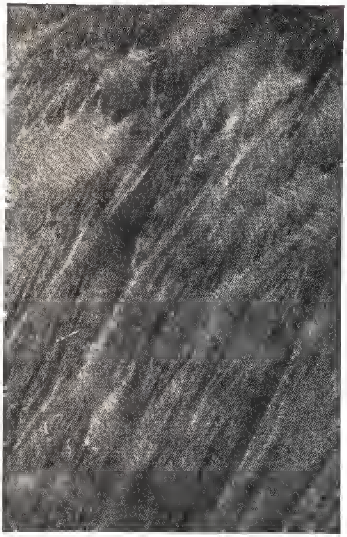
Feather Grained Mahogany

Crotch Mahogany Burl

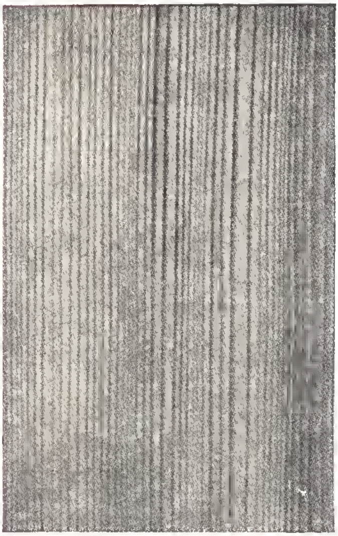


Quarter Sawed Mahogany

Quarter Sawed Black Cherry



Redwood Burl



Edge Grain Redwood

Slash Grain Redwood

Western Hemlock

Straight Grained Elm

Turpentine is produced by longleaf yellow pine, being distilled from the tree product. In the dressed lumber from this tree the sun draws the sap to the surface, and this sap is a solvent of the oil in the paint. It soon destroys the life of the paint which is mixed with too much oil. Much trouble comes from the use of rich oil coats of paint on hard, resinous pine.

Because of the great variation in the absorbing ability of hard pine lumbers, all a painter can do is to size up the wood as a whole on each job and then estimate about how much more turpentine and how much less oil than usual to use in mixing his paint. It is also well to allow more time between coats than usual for drying. The proportion of turpentine will vary from 25% to 50% of the total liquid used. Make the coats thin and then the turpentine will help the paint to penetrate. Do not allow the brush to slide over the surface, but rub the paint well into the wood as you go.

An advantage is gained by permitting the new lumber in a hard pine building to stand exposed to the weather several weeks if possible. Then the weather will raise the grain of the wood enough to roughen it up a little. In that condition the lumber permits the paint to penetrate the pores better. A rough surface, also, will hold more paint pigment, meaning that it will hide the dark boards better. Three thin coats are always needed on this wood. Two thick coats rich in oil will often crack and scale off no matter what kind of paint is used.

The best of judgment must be exercised, however, in letting a new building stand for long in the weather without the priming coat. If permitted to stand too long for the kind of lumber used, the joints will open up, nail holes will split and the job will be injured by such a course.

Hard pine of the kinds just described are often finished in their natural color by simply varnishing. They are stained effectively with practically all colors, but do not take a good gray stain. When finished in its natural colors this wood gets very dark in color after a few years.

Poplar: Sometimes called whitewood and yellow poplar. Used largely for clapboards, or weatherboards, for the exterior of wood buildings. Cypress is now taking the place of poplar in many localities for this purpose.

Poplar is soft, not very elastic, clear, close and straight

grained. It seasons well, shrinking little and is moderately strong and light in weight.

An easy wood to paint, having good absorbing ability. Its light, even color makes it easy to cover and hide with paint. Makes an excellent base for white enamel and paint; takes any stain well but is not especially attractive as to grain or figure. Not used much for interior trim except for enamel.

Cottonwood: Not a very satisfactory wood for the building of houses, but used largely for making paper pulp. Substituted for whitewood (poplar)—but is not as good. A close-grained, compact, light-weight wood which is very soft. The sapwood is light in color; the heartwood is dark brown. Has little strength and warps considerably. Quite absorbent and so can be easily painted.

Cottonwood is so soft, open and spongy that it absorbs moisture excessively. If allowed to stand in the weather, it will mould, turn very dark and decay on the surface. Then it is treacherous to paint; the wood having no strength, the paint will scale as the wood beneath it crumbles away.

This wood is subject to dry-rot, also If painted when wet, dry-rot will occur under the paint and cause it to scale—the boards will dry-rot from the back. Paint cottonwood only when dry. Use plenty of oil in your paint and do not make it dry too rapidly.

Basswood: Called linn, also linden. A straight, close-grained wood of compact structure and it is very soft. Light in weight and in color. Moderately strong. Used to some extent for exterior construction.

Basswood absorbs paint readily. The paint should be mixed thin, using linseed oil mostly; because of the compact nature of the wood structure a little turpentine is desirable. Paint dries well on basswood and it covers and hides the surface easily, owing to the very light color and uniform grain and figure of this wood.

Red Gum: Also called Sap Gum and (in Europe) Satin Walnut. A very popular wood today which is used for interior trim of houses and for furniture, both plain and quarter-sawed.

In appearance gum resembles walnut so closely when finished that few people can distinguish the difference. Red gum holds a rather unique position as to appearance, in fact. It is doubtful if the natural grain of any

wood may be converted, merely by different staining and finishing methods, to so closely resemble as great a variety of other woods as red gum. This wood selected for figure is the only wood which successfully imitates Circassian walnut; while straight grain gum can be stained to an exceedingly close likeness to mahogany, walnut, cherry and maple.

Red gum is especially adapted to dull finishes, taking on a satin-like sheen, which, even in a natural finish does not show finger marks. The fine, compact grain which helps this latter characteristic also makes gum an unusually satisfactory wood for enamel and paint finishes.

By reason of its rich natural color, gum is better without a pigment stain. When a thin stain is wanted to even up the tone or for making it darker, use a thin, transparent, penetrating aniline oil, spirit or water stain; then wipe it off after a few minutes. It is not impossible to use pigment oil stains when the color pigment is very fine.

A coat of thin shellac is usually used to fill the pores of gum. Then after sandpapering, pale varnish is used in thin coats. A heavy coat of varnish may pull out of the wood pores.

Gum is not much used for exterior building. It is not durable when exposed; it shrinks and warps badly in seasoning outside.

Gum is a rather heavy, soft, strong, close and cross-grained wood. Quite dark in color with an attractive darker grain figure which is quite prominent as a rule. The sapwood is a light cream in color, while the heartwood is reddish brown. These two colors of wood cut from the same tree are often referred to as Sap Gum and Red Gum.

Gum absorbs paint a bit more slowly than white pine and poplar, but is not difficult to paint. Use only the usual amount of turpentine; mix the coats thin and allow plenty of time to dry between coats.

Gum used for interior trim is often finished in its natural color, using no filler except shellac. Usually, however, gum is given a light, thin coat of stain and then, when varnished, it is a fairly dark brown, resembling walnut.

Gum is usually painted on the back before erection as interior trim. This is done to prevent the wood from

absorbing moisture from new plaster and it therefore prevents warping after the carpenters have nailed it in place.

A few years back gum was looked upon as a very unsatisfactory wood. It was not then known how properly to season the wood and it did warp, shrink, split and try it is best to crawl all over the house. Now is it known how to season it and so gum is a decidedly satisfactory and beautiful wood for interior use. The supply of gum is ample for many years to come.

Oak: A wood of many varieties but all quite similar, except as to color; white oak is quite light in color; black oak is darker; red oak has a red tone to it, as the name implies.

Oaks are little used now for exterior building purposes, though early in our history, and before that in Europe, oak was used for exterior, interior and furniture construction.

This is an open grained, hard, heavy, strong, tough and durable wood. It is used in America principally for interior trim now—for floors and for furniture.

Oak is sometimes finished without filling the very open grain;—it is simply varnished and then the pores and wood fibres are very prominent. Usually oak is filled and varnished in its natural color, but it takes all stains well. A red or mahogany stain does not look well on it, however; the browns appear very well. Oak is seldom painted or enameled, but it can be easily finished in these ways.

Oak absorbs paint rather slowly. Mix the paint thin and with a little more turpentine than for white pine, for example. Allow plenty of time between coats for drying. Brush the paint well into this wood to fill the large open pores. Three coats are needed to hide the surface and fill it.

Maple: A hard, strong, tough, close grained wood; light in color, heavy in weight. Its structure is very compact.

The even grain and light color makes maple easy to cover and hide with paint. It absorbs paint well and dries moderately fast. The usual amount of turpentine, thin coats and ample time between coats for drying are advisable.

Maple is used largely for floors for which purpose it is sometimes oiled; often, too, it is finished with shellac

only and often with varnish. It of course, requires no filler, having such a close grain.

Maple makes an exceptionally beautiful trim lumber when it is bleached and finished only with very pale varnish. It is naturally so light that the bleaching makes it almost white.

This wood is not used for exterior building construction, being too hard to permit driving of nails through it. It can be and is often painted and enameled on interiors of homes with the best of results.

Birch: One of our very best woods for interior house trim and used much also for furniture construction to imitate mahogany and cherry. Not much used for exterior house construction. It is not especially durable outside when exposed to severe conditions which promote decay.

Birch is nearly as strong as oak, is not as brittle, is close grained, compact and fine in texture. It is quite as hard as oak and maple. The grain is usually straight, but with fairly prominent and attractive figures nicely placed when selected for figure. The sapwood is light yellow, while the heartwood is reddish brown and darker browns.

Birch has a natural high lustre which imparts to it a satiny appearance when finished in stain or natural color. Some specimens compare favorably with satinwood in this respect, having a rich golden color and a wavy grain.

The absence of pronounced grain figure in the straight grained birch, the fine and uniform texture and usual light color make possible the successful application of many finishes and stains. Birch needs no filler.

Birch is used a great deal for interior doors, casings, floors and for all interior trim. It is finished in its natural color by simply varnishing and rubbing. Often a coat of white shellac is put on first as the only filler needed.

This wood is an excellent base for white enamel and painted finishes. It also is stained successfully in mission, brown, gray, light and dark green, and to imitate bog oak, fumed oak, walnut mahogany and cherry.

Cypress: A close, straight grained soft wood. Has dark brownish heartwood and yellowish white sapwood. It is a moderately strong wood. The cypress tree grows in swamps and when green the wood is very heavy with

moisture and an oily sap; but properly seasoned it becomes very light in weight.

This wood is noted for its resistance to decay, even where subjected to moisture and other conditions which promote decay. It has no resin ducts, is not resinous or pitchy like hard pine, but it does contain a great amount of oily sap, a compound having antiseptic properties and which imparts a waxy feel to the planed lumber. This oily sap should be wiped off with benzine before any staining is done upon cypress.

Much cypress is used now for weatherboards for wood houses, also for window sash and doors, for floors and other wood trim.

Unless selected for color cypress must be stained to be suitable for interior trim because there are great variations in color between the sapwood and heartwood. Stains readily even up this color difference; penetrating stains subdue the strong grain and figure, leaving an even tone. Sometimes it is well to wipe the stain soon after it is brushed on, the purpose being to rub it well into the softer and lighter colored parts with the cloth; this also wipes some of the stain off of the darker grain figures, tending to give an even tone to the surface as a whole, yet allows a contrasting grain figure to show, which are sometimes called highlights.

Cypress seasons well; does not shrink much, swell or warp in the presence of moisture. Nearly all cypress is air seasoned. It behaves badly in dry-kilns when green.

Cypress is a difficult lumber to paint for exterior wear unless it is understood. The priming coat should be thin and carry about 75% of turpentine. Paint dries slowly on cypress, so plenty of time between coats must be permitted—three weeks are none too much. Three thin coats well brushed into the wood are needed to hide this surface. Thick coats rich in oil will scale, often, from cypress.

Cypress used for interiors when well seasoned does not require a filler as a rule. Staining, varnishing, and rubbing complete the finishing. Cypress may of course be painted and enameled. It holds such finishes well.

Hemlock: A rough, coarse, soft lumber used only for exterior building construction for the roughest parts of buildings. When well seasoned it is light in weight. The grain is open and it is a crooked wood which warps and splits too much to be very satisfactory. It is not strong.

Western hemlock is usually better than that known to the East and Middle West.

From the standpoint of painting hemlock is not overly easy to handle. Its absorption is poor and uneven. Paint dries slowly on it. So mix your paint with more than the usual amount of turpentine, brush the paint into the pores well and allow ample time to dry between coats.

Chestnut: A light weight, coarse grained wood resembling oak somewhat in appearance. It is unusually durable. Used but little for exterior building construction and not much anywhere. Although open grained, it absorbs paint rather slowly. It is not the easiest kind of wood to paint successfully. The wood will seem to have its grain well filled with paint when it is first coated, but on drying it is evident that the paint has not penetrated. Mix the first coat of paint with a liberal amount of turpentine, make it thin and brush it well into the wood. The paint will dry slowly, so give it plenty of time to dry between coats. Three coats are needed.

For interior trim chestnut takes stains nicely and a filler is needed.

Walnut: The American black walnut is a comparatively hard, open grained wood which is strong and rather dark brown in color. It is an expensive wood used only for furniture and the finest of interior house trim in veneer form. Great quantities have been used for gun stocks.

Usually walnut is finished in its natural color which is quite a dark or medium dark brown. It is sometimes given a thin coat of brown stain, is filled and varnished to exhibit its naturally beautiful grain. Art effects are gained by using a light colored filler instead of the usual dark brown filler.

Red gum resembles walnut so closely that when used in the same room for trim or furniture few people can tell one from the other.

Circassian walnut is the wood produced by the English walnut tree—as we in America know it—the tree which produces the large nuts known to all. The tree is a native to Europe, but grows also in India, Persia and the United States. Much of this wood coming into this country is shipped from Russia, from the shores of the Black Sea.

A rare wood too expensive to be used except as veneer and for the finest of furniture and interiors. It is quite

hard, open grained, strong and dark in color. Its value is due largely to its prominent and fantastic grain figure. The finishing of Circassian walnut consists of staining, filling, varnishing and rubbing.

Butternut: This wood resembles black walnut in most respects and is sometimes called white walnut. It grows where walnut grows. It differs from walnut largely in color, being quite light, while walnut is very dark. Butternut, also, will not take so high a polish.

This wood is not used in volume, but in some states it is largely used for flooring and other interior trim and for furniture.

Butternut requires a filler, takes stains readily and can be enameled and painted with ordinary methods.

Spruce: A soft wood which resembles white pine. Light in color and weight, it has a straight, close grain with but few pitch pockets. It does not absorb paint as readily as pine, however. A rich, thick oil paint ought not to be used. Thin paint carrying more turpentine than usual is needed. Give ample time for drying and three coats of paint are needed. Spruce is not much used for building construction.

Redwood: A light weight, brittle, soft, coarse but close grained wood. The grain structure is even and compact, but it absorbs paint readily. This wood is a beautiful dark red in color, has no prominent figure but the grain is attractively uniform.

Redwood is used extensively for both exterior and interior building construction. Paint for it should be mixed thin with oil and with the usual amount of turpentine to assist penetration. The dark color of redwood and its requirement of a thin first coat make three coats necessary to hide the surface.

Finishing redwood for interiors requires no filler, only the varnish coats are needed for a beautiful finish in natural color without stain. It can be stained and is also an excellent base for white enamel.

Douglas Fir: Known also as Oregon Pine. A giant tree furnishing lumber for all purposes. In appearance fir is a wood of much beauty and interesting character, possessing distinction in both grain and fibre. The grain effect resembles "watered silk."

Fir is light in weight, strong, soft, close-grained and of a compact nature. It absorbs paint well, but the paint dries rather slowly. Fir is light in color and so is easily

covered with paint. It takes stains well for interior trim, requires no filler and is excellent as a foundation for enamel finishes. Oil stains and spirit stains should be used on this wood. Water and acid stains made with water raise the grain so much it cannot be made smooth with sandpaper.

Ash: Known as Brown, White, Black, and Southern Green Ash. This is a heavy, elastic, strong, very hard, coarse, open-grained lumber which resembles oak. It is used in some localities for exterior construction. Paint dries well on ash, though a little slowly. When ash is used for interior trim it takes stains nicely and, being open grained, requires a filler.

Elm: Used largely for heavy timbers and frame work because it is tough, strong, durable and hard. It is fibrous, heavy in weight and often cross-grained. The sapwood is yellowish white; its heartwood is light brown. Elm has an open, coarse grain and paint dries well on it. Elm is not used extensively in the building trade. If used for interior trim it requires a filler.

White Cedar: Used for exterior building construction extensively in some localities. It is light in weight, soft, brittle, close grained and compact. A durable wood. Its sapwood is light colored, but the heartwood is brown. Cedar absorbs paint well. Plenty of oil is needed which means that a thin priming coat should be used. It takes stains well.

California and Oregon Cedar: The two are similar in character and are used for exterior building. They are light in weight, soft, strong and durable. They are close-grained and absorb paint rapidly. Use a thin priming coat with plenty of oil and some turpentine. So much oil is absorbed that all coats should be comparatively thin, using at least three coats.

Red Cedar: Used to some extent for exterior building, largely for shingles and for making lead pencils. Light in weight, soft, not strong. Has rather a close, even grain with white sapwood and dull red heartwood. Oil of cedar is produced by this tree. It is a paint solvent and unless the wood is thoroughly seasoned this oil will destroy the paint.

Red cedar does not absorb paint rapidly, nor does the paint dry quickly. Mix the priming coat very thin with oil and the usual turpentine, brush it in to the wood

well, giving ample time to dry. Three coats are needed to hide the dark varied colors of red cedar.

Washington Cedar: Classed as a soft wood, but it varies from soft to medium hard. A very close-grained, light weight wood. Absorbs paint unevenly. Mix the paint thin with a liberal quantity of turpentine. Plenty of time must be allowed for drying, because the paint is absorbed unevenly and so dries that way.

Mahogany: The genuine mahogany wood is not often met with in building construction, although in veneer form some extra fine interior trim is made from this expensive wood. Mahogany is soft, open-grained, light weight and strong. It resembles the cedars. In color it is a light, reddish brown—not the deep red color commonly known as mahogany which is a stained finish. Mahogany finished naturally is about as light in color as birch, but with a reddish color tone which is not overly attractive. With age the light color of the natural wood changes to dark brown. In finishing a paste filler is required and a brown stain is becoming more popular than red stain. Fillers used are usually black or very dark with a bit of red in them.

QUESTIONS ON LESSON 29

1. Of what advantage is a knowledge of various. woods and their common characteristics to a painter?
2. Why is hard pine difficult to paint sometimes?
3. What is the color of gum wood? Is it all the same color? What color is sap gum?
4. Is gum wood open or close grained? Is a paste filler used on gum?
5. What kind of filler is needed for oak?
6. Is oak a close grained wood?
7. Where is maple used? Is it a good foundation for enamel?
8. Is birch an open grained wood? What filler is needed? What color is birch wood?
9. What peculiar trait has cypress, requiring special attention when painting?
10. Is cypress heavy and strong?—is it durable?
11. Is mahogany an open or close grained wood? What is its natural color?

LESSON 30

PAINTING NEW AND OLD INTERIOR WOOD TRIM

Here in the United States the painting of interior wood trim is not so often the method used in finishing interior woodwork as it is in Europe. When painting is speci-

fied, rather than staining, natural finishing by varnishing and waxing, it often is to cover up and hide a bad job of other finishing or the painting offers the cheapest way out.

It is reasonable to predict that in the years to come a much larger percentage of homes will have painted and enamelled wood trim. This is probable, because a rapidly growing appreciation of interior color harmony for a room as a whole is evident in the average home.

For many years we have used our abundant supply of various woods for trim in natural and stained finishes because the all too prominent grain and figure in itself seemed beautiful. Personal preferences selected the woods and dictated color and kind of finishes. After that a feeble effort was made to decorate the walls to be not too much out of harmony with the wood trim. This whole procedure in the average house built is bad and unreasonable, because of the finished effect produced. Great progress has been made these last few years in overcoming it, however.

About the most satisfactory way to achieve a final result in home decoration which has the beauty enjoyed by refined, educated taste and is restful, is to consider all elements which enter into the color scheme;—that is to say, the floor color, rugs, furniture, pictures, drapes, wall and ceiling colors and wood trim colors. When this is done the realization comes that, no matter how beautiful natural wood grains and figures are in themselves, they must be subdued and correlated; that the color and strength of the wood trim must be such as will harmonize with walls and furnishings.

And so, sometimes the only way to accomplish color harmony is to paint the wood trim. That is just what is done often both in America and Europe. Then some one color which is evident in the rug or in the principal piece of furniture is taken as a starting point and the walls, trim and ceiling are painted with various tones of that color (lighter or darker), or with other colors which harmonize by contrast. Usually, but not always, the principle followed is that the walls must be somewhat lighter in color than the floor or rugs; the ceiling must be lighter than the wall color; the wood trim may be the same color as the walls or lighter or darker a few degrees.

Painted wood trim which has a high gloss is more

easily kept clean, does not show finger marks prominently and is usually most durable. A semi-gloss, eggshell or satin finish is considered more beautiful by many and can be quite as serviceable as full gloss. Dead flat finished paint, while beautiful, soils easily and is not so easily kept clean, and shows finger marks prominently.

In Lesson 11, Chapter 4, mixing formulae are given for the painting of new and old interior wood trim. Lesson 12 presents the information needed for the correct mixing of colors. Lesson 20 sets forth the working method and procedure which will give good results. Review these chapters. Prepared flat wall paints as well as white lead paint are used on old interior wood.

Painting New Interior Wood Trim: New wood which contains knots and sap-filled streaks, requires first that such places be given a coat of moderately thin orange shellac. Sometimes it is well to spread this shellac coat over the entire wood trim; that is, when the wood is generally of a sappy nature and when a really fine job is to be done. Without the shellac coat on such wood the first coat of paint may dry spotty with gloss and flat spots.

The next step is to putty up all nail holes and other imperfections with a putty made by adding enough dry whiting to white lead-in-oil paste as it comes from the keg to make it stiff. A few drops of varnish improves this putty.

When the putty is hard and dry, which will be the next day after filling, sandpaper the whole surface with No. 1 paper to smooth up. Then it is well to clean off the surface with a cloth dampened a little with water or benzine, but do not get the surface wet.

Immediately after cleaning up the surface, spread on your first, or priming, coat, being careful to have clean brushes and well strained paint. Strain the paint and clean your brushes several times during the completion of the job if really fine work is to be done. Follow the procedure as to which parts of the trim are to be painted first, as outlined in Lesson 20.

Allow a day or more for the first coat to dry. Sandpaper lightly all over it using No. 0 or No. ½ paper. Rub just enough to remove any dust and dirt nibs. Then clean up as before and spread on the second coat.

At least a day is needed for drying of the second coat and two or three days are much better if it is possible to allow the time.

When the second coat is dry, sandpaper and clean it as you did the first. Then brush on the third coat and let it dry to finish the job. Sometimes a fourth coat is needed, depending upon several conditions.

Painting Old Interior Wood Trim: If the wood has been painted before, wash it down with a little benzine on a cloth to remove any grease (keep in mind the fire risk and do not use more than a few drops of benzine on your cloth at a time).

After cleaning the wood, putty up the holes and let it dry. Sandpaper it smooth with No. ½ paper. Clean again and paint with two coats, sandpapering and cleaning the first coat. See Lesson 11 and 12 for mixing formulae and colors.

If the old wood trim has been varnished and finished in the natural color, or varnished over paint or graining finish, simply rub it down with No. 1 sandpaper to remove the gloss. Clean up the surface with a damp cloth and then putty the holes. Paint two coats using very little linseed oil and mostly turpentine—not more than a quart of oil to 100 lbs. of lead. The mixture given in Lesson 11 for Old Inside Work, Finishing Coat, Eggshell gloss is about right in proportions.

If the old wood trim has been enameled before and is now to be painted, handle it the same as above described for an old varnished surface.

A surface which has been waxed is a treacherous one to paint unless you first remove the wax by washing it with alcohol, or a strong washing soda powder can be used if the water is hot and the surface is scrubbed. Over such a surface but little linseed oil should be used in the new paint.

LESSON 31

ENAMELING NEW AND OLD INTERIOR WOOD TRIM

An enamel job may be done in several ways which differ from each other principally in the number of coats put on, the amount and kind of rubbing done and in the quality of materials used.

An inexpensive enamel job may mean but two coats of paint and a coat of enamel. A good method to follow, one which will produce a high class, durable finish is given below. It will not craze, nor will it turn yellow, unless

put in dark closets where no white enamel or paint can remain white for long.

Enamel on New Interior Wood Trim: Review Lessons 11 and 12, Chapter 4, also Lesson 20, Chapter 5, for mixing directions, coloring and procedure in brushing the paint on to the surface.

All knots in the new wood should be given a coat of orange shellac moderately thin; the sappy places—a board here and there—need the shellac coat too. Often it is wise to spread the shellac coat over the entire surface. Then when the shellac is dry sandpaper the whole surface lightly after all holes have been filled with putty which has become dry. Wipe up the surface clean, and you are ready to brush on the first coat.

First Coat: Mix this priming coat in the proportion of 100 lbs. pure white lead; 3 gallons pure raw linseed oil; 4 gallons turpentine; 1½ pints Japan drier. This makes about 10 gallons of paint. Brush this coat well into the pores of the wood; allow not less than 24 hours for drying, more if you can. Putty all nail holes; sandpaper smooth when the putty is dry and then wipe all dust from the surface.

Second Coat: Mix in the proportion of: 100 lbs. pure white lead, 1½ gallons raw linseed oil, 1½ gallons turpentine, 1 pint Japan drier. This makes about 6 gallons of paint. Brush this coat out well and smoothly; let it dry 24 hours or more and then sandpaper lightly to remove the dust and dirt nibs. Wipe up the surface clean with a cloth.

Third Coat: Mix this in the proportion of: 50 lbs. pure white lead, 50 lbs. pure zinc oxide, 2½ gallons turpentine, 2 pints white enamel. Flow this coat on as smoothly as possible, but not too thick to run. Allow not less than 24 hours for drying; sandpaper lightly with No. 00 paper; wipe the surface clean with a cloth or, better yet, a chamois skin.

Fourth Coat: Spread on evenly a coat of first class white enamel just as it comes from the manufacturer's can except that 1 pint of turpentine should be added to each gallon of enamel. Stir the turpentine thoroughly into the enamel and be sure to have the material not colder than 70 degrees, if you would have it perform correctly under the brush. It is necessary to allow 48 hours for drying and more time is better. Then rub this coat down lightly and evenly with No. 00 sandpaper, steel

wool or a wad of horse hair to remove dust and dirt nibs. Then clean up the surface again. Be very particular about cleaning this last time, if you would have the finished job free from specks, dust and bristles.

Fifth Coat: Brush on evenly a full bodied coat of the white enamel just as it comes in the can from the manufacturer. Do not thin it with anything, but see that it is not cold—it should be at a temperature of about 70 degrees to work properly under the brush.

Dip your brush to have it moderately full of enamel; coat in only a small area—about a foot square—lay off the enamel to smooth it up by stroking first one way and then the other. The skill needed here is to be able to flow on enough enamel for a full, heavy coat and yet avoid putting on so much as will cause runs, sags and fat edges. Brushing enamel calls for all the skill of the best mechanics under some conditions. Nothing but extreme care, watchfulness and your determination to succeed will do this work well. The enamel sets rather quickly and so any fixing you want to do must be done as you go along with your brushing. Open windows and draughts make enamel set faster.

When enamel is to be colored, all under coats should also be mixed to the light color wanted—approximately, using colors ground in oil as for any paint. The fourth and fifth coats, however, must be colored with tinting colors ground in Japan for best results. Colors ground in oil can be used in full gloss enamel when only a little color is needed. They are first thinned with a little turpentine, then strained before adding the color to the enamel. If oil colors are used in enamel which is to dry with a flat finish, they may cause too much gloss or a spotty surface effect.

Rubbing with Pumice and Water or Oil: A dull enamel or satin finish is produced in two ways: Usually the last coat of enamel used is such as is made by its manufacturers to dry without gloss—called satin finish enamel. The other way to secure a dull finish enamel surface is by rubbing the final coat of gloss enamel with fine pumice stone in water or oil.

For the rubbing of enamel and varnish the dry pumice stone is mixed into a thin consistency with any non-drying oil—motor oil is good. Or the dry pumice stone is simply put in a shallow box to be taken up by dipping a felt pad soaked in water into it. A felt pad about three or

four inches square and about an inch thick is wrapped on a block of wood, dipped into the pumice and oil liquid, or in the box of dry powder, and is used to rub the enamel. If water rubbing is to be done the surface must be kept wet.

The rubbing of an enamel or varnished surface must be lightly and very evenly done. Especial care is necessary to keep away from sharp edges of panels and all corners, as you can easily cut through the enamel or varnish to the bare wood at these places. When the surface has been rubbed it is then washed clean with a cloth dampened with benzine in case oil rubbing was done, or with clear water if water was used in the rubbing. It is best to rub in the same direction as the grain of wood runs.

A much quicker way to rub enamel, varnish and shellac finishes, a method which often does well enough is to use in place of the rubbing felt an old round or flat wall brush. Cut the bristles off until they are only about two inches long. Dip the brush into the pumice stone liquid and rub the surface evenly with it. Bear down fairly hard on the brush, but not so hard as to force the wood plug or metal ferrule of the brush to scratch the enamel.

Enamel on Old Interior Wood Trim: The various kinds of old surfaces should be painted as per Lesson 30 to dry with a flat finish. Then the enamel job should begin with the third coat and be carried through the fourth and fifth coats, as specified for **Enamel on New Interior Wood Trim.** Of course, the third coat in the enamel schedule could be eliminated to reduce expense if necessary.

QUESTIONS ON LESSONS 30 AND 31

1. What should be the object sought in painting interior wood trim?
2. Would you be justified in painting a nicely stained or natural finished oak to make it harmonize in color with the walls and furnishings?
3. Name progressively the necessary operations for a job of painting on new interior wood trim.
4. Why is it necessary to sandpaper each undercoat?
5. Is it possible to sandpaper the paint the same day it is put on?
6. Can you paint over a varnished wood without removing the varnish? Can you paint over top of enamel?—over calcimine?

7. How many coats are necessary to produce a good enamel job?
8. Why is it that only a very little linseed oil is used in enamel undercoats?
9. What is used to mix colored enamel?
10. Does all enamel dry with a high gloss?

LESSON 32

WOOD STAINS AND THEIR MIXING

The subject of stain mixing is a bit confusing until the various kinds of stains are clearly fixed in mind; then it is quite as simple as paint mixing.

Stains may be classified as: Oil Pigment Stains, Oil Pigment Penetrating Stains; Oil Aniline Stains; Oil Aniline Penetrating Stains; Varnish Stains; Water Aniline Stains; Water Pigment Stains; Spirit Stains; Acid or Chemical Stains.

Not so many years ago painters made all stains used right in their own shops. Some painters still prefer to do so, there being some advantages to be gained that way. But the time required in this work must be seriously accounted for in their cost at present day wage scales before believing they are cheaper stains than those prepared ready for use by manufacturers. Most of the stains used today are those manufactured ready for use by the paint and varnish industries.

When it comes to mixing acid stains it is necessary to use rubber gloves while handling some of the acids—muriatic acid, nitric acid, sulphuric acid and others. These burn the skin and clothing. Potash, caustic soda, strong ammonia and such chemicals must be handled with care to avoid injury to person and clothes.

Any stain mixed is better for standing a day or more. This should be done whenever time permits, as it matures the stain and insures better results.

Mix all stains by measure or weighted quantities; then write down the amounts of the various ingredients. After that you can exactly duplicate the stain, if you run short or accidentally spill the first lot. Otherwise, you have lost or will waste much time in a second batch to match the first.

You can mix a stain to match a sample panel of stained wood only if you are working on exactly the same wood. It is not possible to stain red oak, for example, to exactly match white oak samples: a mahogany stain which is just right on birch will not match that wood when used on gum or cypress.

OIL PIGMENT STAINS

These are about the most permanent stains and are the most convenient for the painter to mix in his shop. They are not so bright as other kinds,—the anilines for example, but are satisfactory for browns especially and some others on most jobs.

These stains are made with tinting colors ground in oil such as are used for coloring paints. It is very important, however, to use only the very best grades of such colors in order to secure the finest ground pigments. These colors are not really soluble in linseed oil, turpentine and benzine, but mix readily with them. To a limited extent these colors fill the wood pores as well as stain the fibre. It is easily to be seen then that if cheap, coarse colors are used or those which are extended considerably with inert pigments like silica, barytes and others the stain will cloud the grain and figure of the wood; then the finish will not be so clear and bright as with fine, comparatively pure color pigments.

It is possible to secure from manufacturers' stocks now a great variety of stains of all classes. Because these are uniform in coloring strength, convenient and moderately priced, such stains are used for the bulk of the staining work today on residence buildings.

Stains are classed according to the liquid used in their makeup, rather than by the coloring ingredient; that is, as oil stain, water stain, varnish stain, alcohol and spirit stains. Wood dyes are also merely a class of stains similar to the others described.

A point which it is well to keep in mind is that coloring or staining abilty of a stain is different on each kind of wood; for instance, a walnut stain which would produce just the right brown on gum wood and cypress probably would make too dark a brown on poplar, bass or white pine; it might be too light in color on such close-grained woods as maple and birch.

The tinting colors useful for mixing stains are only those which are fairly transparent such as: Raw and burnt umber, raw and burnt sienna, French yellow ochre, Prussian blue, chrome green, Vandyke brown and some of the lake pigments. Chrome yellow, for example, is not suitable for stains—it covers and hides the surface too well, being largely white lead.

When mixing pigment stains follow about the same procedure as when mixing paint. Put the color paste in a pot, add a little liquid at a time,—first use the Japan drier,

preferably—and stir this thoroughly to break up any lumps of color. Then gradually add all of the liquids and after mixing strain the stain through cheese cloth, or a wire strainer.

Following are some mixing formulae which are approximately correct for average conditions:

LIGHT OAK PIGMENT OIL STAIN

1 lb. Italian raw sienna.
4 oz. French yellow ochre.
1 pt. Japan drier.
½ gal. boiled linseed oil.
Makes about 1 gallon of stain.

ANTIQUE OAK PIGMENT OIL STAIN

1 lb. Italian raw sienna.
4 oz. Turkey burnt umber.
¼ pt. asphaltum varnish.
1 pt. Japan drier.
½ gal. boiled linseed oil.
2¼ pts. turpentine or benzine.
Makes about 1 gallon of stain.

GOLDEN OAK PIGMENT OIL STAIN

1 lb. Italian raw sienna.
½ lb. Turkey burnt umber.
1 pt. Japan drier.
½ gal. boiled linseed oil.
2½ pts. turpentine or benzine.
Makes about 1 gallon of stain.

CHERRY PIGMENT OIL STAIN—DARK

1½ lbs. Italian burnt sienna.
1 pt. Japan drier.
½ gal. boiled linseed oil.
2½ pts. turpentine or benzine.
Makes about 1 gallon of stain.

MAHOGANY PIGMENT OIL STAIN—RED

¾ lb. Italian burnt sienna.
½ lb. rose pink.
½ pt. Japan drier.
½ gal. boiled linseed oil.
2½ pts. turpentine or benzine.
Makes about 1 gallon of stain.

DARK OAK PIGMENT OIL STAIN

1 lb. Italian raw sienna.
4 oz. Turkey burnt umber.
1 pt. Japan drier.
½ gal. boiled linseed oil.
2½ pts. turpentine or benzine.
Makes about 1 gallon of stain.

MISSION OAK PIGMENT OIL STAIN

2 lbs. drop black.
1 oz. rose pink.
1 pt. Japan drier.
½ gal. boiled linseed oil.
2 pts. turpentine or benzine.
Makes about 1 gallon of stain.

CHERRY PIGMENT OIL STAIN—LIGHT

¾ lb. Italian burnt sienna.
½ lb. Italian raw sienna.
1 pt. Japan drier.
½ gal. boiled linseed oil.
2½ pts. turpentine or benzine.
Makes about 1 gallon of stain.

MAHOGANY PIGMENT OIL STAIN—BROWN

¾ lbs. Italian burnt sienna.
¼ lb. maroon lake or rose pink, or about 1 oz. of alizarine permanent red aniline-oil soluble.
¼ lb. Vandyke brown.
½ pt. Japan drier.
½ gal. boiled linseed oil.
2½ pts. turpentine or benzine. For very dark effect fill the wood with black paste filler.
Makes about 1 gallon of stain.

ROSEWOOD PIGMENT OIL STAIN

1 *lb.* rose pink.
½ lb. Italian burnt sienna.
1½ pts. Japan drier.
3½ pts. boiled linseed oil.
2 pts. turpentine or benzine.
Makes about 1 gallon of stain.

In staining other hard woods to a rosewood effect, a little drop black made thin with turpentine and oil should be brushed on with a sash tool to make a few dark streaks; wipe it with a dry brush, too, to spread it.

EBONY PIGMENT OIL STAIN

For an ebony stain on work which is not very particular an oil stain can be mixed this way:
1¼ lb. drop black.
1 oz. Prussian blue.
1 pt. Japan drier.
3 pts. boiled linseed oil.
½ gal. turpentine or benzine.
Makes about 1 gallon of stain.

For ebony finish water and spirit stains are used more than oil stains. The water and spirit stains penetrate deeper. Ebony often is not filled, but is finished with open grain effect in wax or varnish.

MISSION OAK PIGMENT OIL STAIN

2 lbs. drop black.
1 oz. maroon lake.
1 qt. Japan drier.
1 pt. boiled linseed oil.
½ gal. turpentine or benzine.
Makes about 1 gallon of stain.

WALNUT PIGMENT OIL STAIN

1 lb. Turkey burnt umber.
4 oz. Vandyke brown.
1 pt. Japan drier.
½ gal. boiled linseed oil.
2½ pts. turpentine or benzine.
Makes about 1 gallon of stain.

GRAY PIGMENT OIL STAIN

4 oz. lampblack.
2 lbs. zinc oxide.
1 pt. Japan drier.
1 pt. boiled linseed oil.
2½ qts. turpentine.
½ pt. benzole 90 per cent.
Makes about 1 gallon of stain.

This makes a permanent gray stain which will not turn yellow, **if finished with white wax.** If gloss is required, finish with white shellac first, then apply the varnish.

FOREST GREEN AND FLEMISH GREEN PIGMENT OIL STAIN

1 lb. drop black.
½ lb. **chemically pure** chrome green.
1 qt. Japan drier.
1 qt. boiled linseed oil.
½ gal. turpentine or benzine.
Makes about 1 gallon of stain.

If too dark, add a very little medium chrome yellow.

PENETRATING OIL PIGMENT STAINS

The formulae given in the foregoing section are correct for penetrating stains also with these exceptions and additions:

For close-grained woods, such as birch, cypress, maple and hard pine (and those well filled with sap), omit 1 pint of the linseed oil specified and add 1 pint of benzole—90 per cent.

For open-grained woods like oak, soft pine, walnut and mahogany not more than one-half pint of benzole—90%—

should take the plaee of an equal quantity of linseed oil specified. On many occasions no benzole at all is needed for these woods.

ANILINE OIL STAINS

These are such stains as are made from coal-tar derivatives known as fat anilines or oil-soluble anilines. The anilines are sold in dry powder form. They are brighter and more transparent than pigment colors; stains made from the anilines do not eloud or hide the wood grain and figure.

The aniline stains are permanent as to color in the exposure to light (except the blue aniline) when eovered with varnish or wax or shellac. The Alizarine group of these stains especially, is composed of non-fading colors. Alizarine eolors are not exactly anilines, but sort of first cousins to them. Alizarine red is also called permanent red, red lake and madder lake. The Alizarines are classed with earth pigments from the standpoint of permanency of color, although aniline colors as a class are not as permanent as earth colors when used in direct sunlight. They are, however, permanent enough for most praetical purposes.

Rose lake and rose pink are made from the aniline dye called amaranth. They are less permanent as to color in strong light than earth colors, but are used extensively for stains and are satisfaetory for that purpose.

When buying these aniline colors simply designate them as "oil-soluble aniline deep red," for instance; or maroon, dark brown, bright green, orange, blue-blaek, lemon yellow. These are the most permanent anilines. There are, by the way, in the neighborhood of seven hundred aniline dye eolors.

With a few of the aniline colors,—say the black, brown, orange, red and yellow—you can produee almost any stain needed by mixing two or more of them together. Below are a few suggestions for their use:

MAHOGANY ANILINE OIL STAIN

Use the brown aniline powder; or brown and a little of the red.

DARK OAK, ANTIQUE OAK, GOLDEN OAK, ANILINE OIL STAINS

Use the yellow and brown anilines mixed to give just the right shade.

LIGHT OAK ANILINE OIL STAIN

Use the yellow aniline, mixing as thin as necessary to give the color wanted.

ROSEWOOD ANILINE OIL STAIN

Use the red aniline color.

WALNUT ANILINE OIL STAIN

Use brown aniline and a little asphaltum varnish.

CHERRY ANILINE OIL STAIN

Use the red aniline and yellow aniline colors, mixed.

In the mixing of aniline oil stains the best method is to place a pot containing one-half gallon of boiled linseed oil in a pail of boiling hot water away from the fire. When the oil is very hot add ½ pound of the dry aniline color, stirring it until all is dissolved. When this stain is cold add the turpentine or benzine and the Japan drier. It is wasteful to add these volatile liquids to the hot oil because of the rapid evaporation. Here are the approximate mixing proportions:

4 oz. aniline dry color (to be selected)
½ gal. boiled linseed oil
½ gal. turpentine or benzine
¼ pt. Japan drier
Makes about 1 gallon of stain

The above mixture is quite strong for dark effects. Where lighter effects are wanted, add from one-half to one gallon more of turpentine or benzine.

Some painters find it convenient to keep a stock on hand of these stains in the dissolved, concentrated form ready to be thinned more as needed. The aniline powder is dissolved in a little hot linseed oil as described and put into corked bottles or jugs. Having several colors ready mixed in this manner it is possible to quickly mix up any stain needed.

PENETRATING ANILINE OIL STAINS

These are mixed as described in the preceding paragraphs. To secure additional penetration omit about one-half pint of turpentine or benzine; add about one-half pint of benzole 90%.

VARNISH STAINS

For moderate priced work varnish stains are used extensively. Varnish stains made with pigment colors mixed in good floor varnish are probably more serviceable when

used on floors, than oil, water or spirit stains. When the latter stains are used, they are of course varnished over with clear varnish. Varnish stains are used a great deal by people who are not painters by trade for refinishing furniture and for many other purposes about the house.

Varnish stain colors the wood, fills it to some extent, and adds a gloss finish all in one coat. It has a legitimate purpose, but is not really satisfactory for high class work.

The coloring material in these stains may be the same pigment tinting colors ground finely in linseed oil as were specified for oil stains and for coloring white paints; it may be the same pigment colors ground in Japan or varnish instead of oil; or the oil soluble fat aniline colors may be used for making varnish stains.

In the mixing of varnish stains as with the mixing of oil stains and paints, the color pigment should always be mixed first with a small amount of the liquid (the varnish in this case). Then the balance of the liquid can be added, stirring in a little at a time. After mixing carefully, strain the stain through cheese cloth or wire strainers.

Here are formulae for some of the most common varnish stains used; mixed with tinting colors ground in oil or Japan :—

LIGHT OAK VARNISH PIGMENT STAIN

1 lb. Italian raw sienna.
1 gal. thin varnish (floor, interior coach or spar).
Makes about 1 gallon of stain.

DARK OAK VARNISH PIGMENT STAIN

1 lb. Italian burnt sienna.
4 oz. Turkey burnt umber.
1 gal. thin varnish (floor, interior coach or spar).
Makes about 1 gallon of stain.

CHERRY VARNISH PIGMENT STAIN

1 lb. Italian burnt sienna.
4 oz. Italian raw sienna.
1 gal. thin varnish (floor, interior coach or spar).
Makes about 1 gallon of stain.

MAHOGANY VARNISH PIGMENT STAIN—Red Effect

½ lb. Italian burnt sienna.
½ lb. rose pink or maroon lake.
½ pt. Japan drier.
7 pts. varnish (floor, interior coach or spar).
Makes about 1 gallon of stain.

MAHOGANY VARNISH PIGMENT STAIN—Brown Effect

½ lb. Italian burnt sienna.
½ lb. rose pink or maroon lake.
½ lb. Vandyke brown.
½ pt. Japan drier.
6 pts. varnish, thin (floor, interior coach or spar).
Makes about 1 gallon of stain.

WALNUT VARNISH PIGMENT STAIN

1 lb. Turkey burnt umber.
¾ lb. rose pink.
7 pts. thin varnish (floor, interior coach or spar).
Makes about 1 gallon of stain.

VARNISH ANILINE STAINS

The aniline colors were described under the heading of Aniline Oil Stains. When these colors are used by the painter to mix varnish stains they had best be dissolved in a little hot linseed oil as specified for oil stains. Then have the varnish warm, not hot, when the colors in solution are added to it. These colors are soluble in hot turpentine, benzole and benzine, but it is not practical for the painter to attempt this solution; furthermore, the fire risk is great and then these liquid solvents would kill the gloss of the varnish which the painter would use.

The aniline colors are very strong, so but little color is needed for a gallon of varnish. Mix the stain about this way:—

2 oz. aniline dry color
1 pt. hot boiled linseed oil
1 pt. Japan drier
1 gal. thin varnish (floor, interior coach or spar)
Makes about 1 gallon of stain

WATER STAINS

As the name indicates, these are stains made with water and coloring materials soluble in water. They were used much more extensively a few years ago than at the present time. Oil and spirit stains are somewhat more convenient to handle. Water stains produce superior results, however, for certain kinds of work when correctly handled. The common water stains used are mixed with pigment and vegetable coloring matter—raw and burnt umber, raw and burnt sienna, Vandyke brown, lamp black, ultra marine blue, chrome green—all ground in water or what are called distemper colors. The pigment colors used must be finely ground. Following are some common formulae:

MAHOGANY WATER STAIN

Dilute nitric acid with water. Brush this on to the wood and let it dry.

2 oz. dragon's blood (a dry, red powder) dissolved in alcohol.
2 oz. sal soda dissolved in ½ lb. water.

Strain this mixture. Brush it on to the wood. If not dark enough when dry put on another coat or two coats if needed.

LIGHT OAK WATER STAIN

1 lb. annato.
1 oz. lye.
6 qts. water. Boil above for ½ hour, or longer to make a darker stain.
6 oz. picric acid.
Brush on one or more coats until dark enough.
Makes about 1½ gal. of stain.

DARK OAK WATER STAIN

1 lb. Turkey burnt umber (dry or ground in distemper).
½ lb. Italian raw sienna.
4 oz. aqua ammonia.
Enough warm water to make the light or dark stain wanted.
Strain and brush on to the wood.

CHERRY WATER STAIN

1 lb. annato.
1 oz. concentrated lye.
6 qts. water.
Boil for one-half hour, or longer for a darker stain.
Apply the stain warm.

EBONY WATER STAIN

3 lbs. extract of logwood.
1 lb. concentrated lye.
7 lbs. water.
Boil this mixture, strain it and brush on hot or cold.

When the stain is dry, brush on a coat of vinegar in which a few ounces of copperas has been dissolved. Copperas dissolves better in hot vinegar.

WALNUT WATER STAIN

2 lbs. Vandyke brown dry color.
1 lb. potash or concentrated lye.
1½ gal. water.

Boil the above until about half of it has steamed away. Then strain and brush on, or rub in with a cloth.

Or use this formulæ:
4 oz. Vandyke brown dry color.
4 oz. Turkey burnt umber dry color.
1 pt. aqua ammonia.

Mix and strain the mixture. Let stand a few days and the strong ammonia odor will largely disappear.

GRAY WATER STAIN

3 lbs. extract of logwood.
½ pt. vinegar.
7 lbs. water.

After staining, finish the wood with white wax. Varnish or shellac turns gray stain brown.

Another way to make a gray water stain for hard wood is to apply to the wood first a solution of extract of gall nuts, then a solution of sulphate of iron (green copperas) and last a very thin, weak solution of indigo. The solution of gall nuts is made by soaking powdered gall nuts in denatured alcohol for two days, then strain.

The solution of sulphate of iron is made by dissolving green copperas in alcohol or boiling water.

The solution of indigo is made by dissolving indigo in four times its weight of oil of vitriol (66° Bé sulphuric acid) and then diluting it with water after it has settled.

Make these mixings in glass or stone jars very carefully.

WATER ANILINE STAINS

These are made by adding to water what are called water soluble aniline colors. They come in black, red, yellow, blue, green, brown and orange. Those called alizarine colors are most permanent in strong light.

For most of these colors various manufacturers have their own names, but some of them are sold by all manufacturers under the same names; they are Bismarck brown, nigrosine black, red alizarine or permanent reds, and also a few others.

Before the advent of soluble aniline or alizarine dyes, water stains were mostly decoctions of roots, berries, woods steeped or boiled in water and solutions of acids or ammonia added as mordants as given in some of the preceding formulae. The aniline colors simplify the matter of stain mixing and they are largely used in furniture and other woodworking industries.

Water stains of the aniline class are mixed this way:—

4 oz. water soluble aniline dry color
3 gal. boiling hot water
1½ pts. vinegar—the ordinary table kind
For a strong stain, use less water

From walnut stain Bismarck brown is used; for ebony, mission and antique oak finishes nigrosine "B" aniline color is used; for cherry stain, red alizarine and a little yellow are used; for mahogany stain, red alizarine with Bismarck brown serves well.

SPIRIT STAINS

These are used where quick work is necessary and when water stains are objectionable because the water raises the grain of the wood. They penetrate deeply, but are not so easy to handle as oil stains.

Spirit stains are usually mixed by using spirit soluble aniline colors similar to the oil and water soluble anilines previously mentioned. The colors are dissolved in denatured alcohol. The alcohol must be hot for best results. It is dangerous to heat it on a fire, of course; so the pot of alcohol is put into a pail of hot sand or in a pail of boiling hot water away from the fire.

The mixing proportions for all spirit stains are about as follows:

2 oz. spirit soluble aniline dry color
1 gal. denatured alcohol

Dissolve the aniline color first in 1 quart of the alcohol hot. Then add the other three quarts cold. Makes about 1 gallon of stain.

ACID OR CHEMICAL STAINS

There are many methods which are more or less used on woods which contain tannic acid such as oak to change their natural color to another color and a stained appearance.

The staining of woods with chemicals usually represents a process, rather than the mere mixing of two or more materials, and it requires rather extensive knowledge and experience. Such staining processes are used principally in factories turning out standardized products, although some of the older painters may still use them.

There are many chemicals which are available for staining effects, but the principal ones are these:

Ammonia, used for producing fumed or light brown effects; chloride of iron when dissolved in water is used principally for producing silver gray effects. This color effect is developed because of the reaction of the iron on the tannic acid, making a black. By using the chloride of iron sufficiently diluted, it produces a bluish black tone.

Potassium bichromate is sometimes used for staining. It is dissolved in water and sponged on the wood, producing a yellow tone. It is little used for house staining, being not practical for that purpose.

Copper sulphate, potassium chlorate, muriatic acid—these chemicals when mixed and dissolved in water stain wood a greenish black which turns to a jet black that is very permanent.

Following are some of the chemical stain formulae used:

ANTIQUE OAK CHEMICAL STAIN

4 oz. permanganate of potash.
1 gal. soft water.

Brush on a coat, let it dry and then apply as many more coats as are needed to make the dark effect wanted. Wash off with clear water.

WALNUT CHEMICAL STAIN

The same stain treatment as specified above for antique oak is the first treatment needed. Then after washing the surface with water brush over it with iron acetate dissolved in water.

GRAY CHEMICAL STAIN

1 oz. nitrate of silver.
3 lbs. water.

Brush on to the wood and let dry. Then brush on a dilute hydrochloric acid solution and let it dry. Then brush on a wash of aqua ammonia.

BROWN OAK CHEMICAL STAIN

Use as a wash a saturated solution of chrome alum in water (all the alum that can be dissolved in a gallon of water).

Or use a saturated solution of manganese sulphate as a wash.

WEATHERED OAK CHEMICAL STAIN

Use a saturated solution of green copperas in water as a wash.

MAHOGANY CHEMICAL STAIN

It is not generally known outside of the ranks of the expert wood finishers that mahogany wood may be fumed with ammonia quite as effectively as oak, importing an antique finish of deep rich brown. This is not the usual method, however; stain is most commonly used.

A decoction of logwood chips is one of the coloring stains mostly used in mahogany staining; it may be made light or dark by boiling the logwood chips in water down until a strong liquor has been made. It may then be diluted with water to the desired strength. Sometimes a little chloride of tin is added to the logwood stain and sometimes a little eosinex dye color. Two coats are to be given.

Mahogany wood may be darkened by applying a coat of weak solution of bichromate of potash in water, but fresh slaked building lime (lumps) is, probably, the best darkener for mahogany wood and the most convenient method to employ. Put the lime lumps in water; when all dissolved wash the surface with the water and lime paste.

FUMED OAK CHEMICAL STAIN

Dissolve four ounces of catechu (gambier) in one gallon of water. Brush on to the wood, or put on with a sponge. A rich brown will result on oak wood. Let it dry and then brush over the wood with a solution of four ounces of bichromate of potash dissolved in one gallon of water. You will then have a fumed oak effect which closely resembles genuine fuming and it will hold its color. Use less water to make a darker stain; also boil the solution for some time.

Hot water should be used in making both of the above solutions, but allow the water to cool before using. The more tannic acid your lumber contains, the better color you will get. With some kinds of oak it is necessary only to use the bichromate of potash solution, omitting the gambier solution. In some cases the repeated washing of the wood with strong ammonia will give the fumed brown stain wanted.

GENUINE FUMED OAK

This finish is secured by placing the wood trim (oak) or furniture to be stained in a room made as nearly air tight as possible. Then several shallow dishes are filled in this room with strong ammonia—26 degree, Bé. The household ammonia is not strong enough.

Tho ammonia fumes act upon the tannic acid in the wood and turn it brown.

Rooms built for fuming have a glass window through which the lumber can be inspected from time to time and removed when dark enough in color. The fuming requires from one to three days. The wood must be free from dirt, grease and glue spots or else white spots will occur in the finish. There must be a free circulation of air about each board to be fumed to insure a uniform color on all lumber.

Fuming does not raise the grain of the wood, it penetrates deeply and gives a permanent, uniform color.

The strong ammonia used is dangerous to breathe, quite as much so as gas, so care must be exercised about entering the fuming compartment.

SILVER GRAY WHITE FILLER STAIN

A novelty finish is often used on oak, chestnut, ash, and gum which have an open grain. The general appearance of the wood is gray, rather a salt and pepper effect. But actually no stain is used.

The raw wood should be coated with boiled linseed oil only. After the oil is dry, clean the pores of the wood free from dust. Then simply fill the wood pores with a light gray paste filler, or with white lead paste just as it comes in the keg. The filler is used very thick;—thin it enough with turpentine to be spread on with a putty knife and scraped off again. Add a little Japan drier. Put the filler on plentifully, rub it in with a stubby brush and then scrape off the excess with a putty knife. Let the filler set an hour or so and wipe off any excess on the surface, being careful not to drag it out of the pores of the wood. Let dry two days.

Next, sandpaper with No. 00 paper, wipe off the surface clean and put on a coat of white wax. Rub the wax to a dull lustre. If a gloss finish must be done, use instead of the wax a coat of white shellac, then varnish. Shellac and varnish will in time turn the gray to a brown.

Sometimes a gray stain is used in addition to filling the wood pores with a white filler. This makes a more permanent job.

CREOSOTE PIGMENT OIL SHINGLE STAIN

Use the best grade of tinting colors ground in linseed oil, the same colors as are used for coloring house paints. Only the best grades are clear and strong enough for stains. Such colors as lamp black, raw sienna, burnt sienna, raw umber, burnt umber, chrome green, French yellow ochre, Venetian red, oxide of iron reds and browns, zinc oxide and ultra-marine blue are all available for these stains.

Thin the tinting colors which are in paste form to about brushing consistency, as you would for paint, before adding all of the liquids to be used.

The stain liquids should be mixed in about this proportion: 4 gallons of raw linseed oil; 2 gallons coal tar creosote oil and 1 gallon of Japan drier.

When this stain is to be used for dipping shingles, 1 gallon of the color paste (about the consistency of paint ready to be brushed) and 7 gallons of the liquids is about right. When the stain is to be brushed on to the shingles about 2 gallons of the color paste are needed for 7 gallons of the oil thinners.

For a cheaper stain the thinner liquid may be mixed from:—3 gallons of kerosene—150 degree test, water white; 3 gallons coal tar creosote oil and 1 gallon of Japan drier.

Silver Gray Pigment Oil Shingle Stain: Mix 20 lbs. of pure American zinc oxide ground in linseed oil with one quart of pale liquid Japan drier; add another quart of the drier after the zinc has been mixed to a smooth paste and stir it in. Add a little lamp black to give a light gray; next add ½ gallon of yellow cresylic acid which will not discolor the gray, but will act as a preservative. Coal tar creosote oil will not be satisfactory because it will discolor the gray stain. Thin this paste mixture with about 8 gallons of benzine. The cresylic acid may be omitted, if you wish.

QUESTIONS ON LESSON 32

1. What is a pigment stain?—a penetrating stain?—an aniline stain?—acid stain?
2. What class of stains is most permanent as to color in strong light?
3. What class of stains is most transparent?
4. What are varnish stains?
5. How is fumed oak color produced? Is it always done by staining?
6. What is the best method to follow in staining shingles?

LESSON 33

STAINING NEW AND OLD INTERIOR WOOD

Before proceeding to working methods a word about the object of staining wood interiors is in order. Just why do we stain woods?

There was a time when much of the staining done was an attempt to make a cheap wood look like an expensive wood—birch to look like mahogany, for instance. Soft woods with little or uninteresting grain and figure were stained to resemble oak, mahogany, walnut. The same spirit prevailed as during the period when graining was popular.

It is well that the age of imitation in wood finishing has nearly, if not completely, passed. Woods are stained and finished generally today for what they are,—to enhance and display the natural grain and figure for itself alone and more especially to so color the wood as to make it harmonize with the color scheme of the room as a whole. Homes are not finished today, as to the wood trim, to display fanciful garish wood figures; rather, the wood trim is subordinated to and corelated with the wall colors, rug colors, furniture and drapes. The plan is now properly to create a room so beautiful as a whole that no one detail stands out alone prominently.

For the mixing formulae for stains, see Lesson 32.

Staining New Interior Wood: If water stain is to be used, the wood should be wet with cold water. This will raise the grain. When dry, sandpaper the wood with No. ½ or No. 1 paper to smoothe down the raised grain. If the stain also raises the grain, it may be very lightly sandpapered when dry.

Water stain should be diluted to the desired strength, avoiding too deep a color. The sponge is the best tool for applying water stain. If a brush is to be used then use a wide one for large surfaces. Several thin applications of water stain are better than one heavy one, because a more uniform effect is gained that way. Each application ought to be dry before the next is spread on. Do not use water stain too freely or an excess of water will cause warping or twisting of the wood in some cases and raise the grain too badly.

For hard woods hot water stain is considered best by many finishers, because it penetrates the wood better than cold stain. At least water stain should be used warm, if

not hot. Soft water is desirable and distilled water is best for stains. Of course, most any stain can be made to appear lighter in color by wiping off some of it before it becomes dry.

When oil stain is to be used it is desirable, but not absolutely necessary, to brush on first a coat composed of 75% turpentine and 25% boiled linseed oil. This makes the stain color the surface more uniformly and also makes it easier to brush on evenly. In staining wood which is not uniform as to suction,—when part of it is filled with gum or sap and part is soft and open—it is sometimes necessary before using oil or spirit stains to spread on a coat of thin white shellac. Then the stain will penetrate more uniformly and a more even color will result.

Any wood to be stained should be made clean and absolutely free from grease, glue, lime and dirt. Stain will not penetrate these substances; when they are removed after staining a light spot results.

A flat wall brush 4 or 4½ inches wide is commonly used for brushing on stains, except water stains for which a sponge is used.

The brushing of water and spirit stains requires quite some skill, especially if the stains are very strong and are used on soft, absorbent woods;—hard woods absorb more slowly. Water and spirit stains usually penetrate deeply on the spots where each brushful of stain is started, leaving darker places. So a comparatively dry brush is best when putting on the stain. With the brush as full of material as it will hold, it is difficult to produce a stained job which is uniform in color all over. Mix the stain thin, then wipe the brush out well and brush the stain over the surface with long rapid strokes. If the color of the wood is not then dark enough when dry, spread on a second coat.

In all cases the stain goes on to the bare wood, or after the oil or shellac treatment mentioned in the first paragraphs of this lesson. The filler goes on **after** the stain is dry.

Filler is used on open grained woods like oak, chestnut, ash, walnut, and mahogany. On close grained woods a coat of white shellac is used as a filler. Stain is mixed with a little of the filler to make it the same color. Shellac, too, is often colored just a little to tone in with the stained color of the wood. For novelty finishes the filler is sometimes made a different color than the stained wood.

Open grained woods are not always filled. Certain

finishes call for open grain effects. For example,—fumed oak, weathered oak, mission oak, Flemish oak and Jacobean finishes should have no filler. The wood is stained, shellaced and waxed—using no filler and no varnish, although sometimes thin varnish coats take the place of the shellac.

The brushing of oil stains is comparatively easy. These do not penetrate so deeply as spirit stains and water aniline stains. Oil stains can be mixed strong. They are often wiped off with a cloth or cotton waste after being allowed to dry fifteen minutes or longer, according to drying conditions in the room, such as ventilation, heat, etc. If the oil stain colors the wood too lightly after wiping and drying, a second coat may be applied.

Oil stains are very satisfactory for soft, open grained woods, especially for brown colors, but do not give so dark a color on hard, close grained woods.

Early English finish, on the other hand, requires a stain, a coat of thin shellac (1 lb. of shellac gum to 1 gallon of alcohol), a paste filler, another coat of shellac, two coats of varnish rubbed to dull lustre. Sometimes no varnish is used—only three coats of shellac over the filler.

A few of the aniline color stains—both water and oil stains—have a tendency to "bleed;" that is, the stain travels through the filler, varnish, paint and enamel. The most common manifestation of bleeding stains is that of mahogany stain which comes through white paint or enamel showing a pinkish color. Bleeding stains are sometimes troublesome because they cloud the grain of stained wood, slow up the drying of the varnish and make a spotty surface.

Knowing this tendency of "bleeding" it is well to make a practise of spreading a coat of shellac over every filler and stain coat. Shellac will often seal up stains which bleed. Excessively strong bleeding, however, can only be stopped by a coat of aluminum bronze.

Staining Old Interior Wood: The staining of wood which has been varnished, shellaced, waxed, painted or enameled is sometimes called for. Then the most important task is the stripping off of the old finish down to the bare wood. A thorough job of cleaning must be done, or the staining will fail to produce a uniform color. You cannot make stain penetrate through varnish, wax, paint, or enamel.

To remove paint, varnish, and enamel use a liquid paint and varnish remover such as is offered by paint manufac-

turers. After scraping off the bulk of the old material, brush on another coat of remover, following the manufacturers' directions, scrape, clean and wipe out as much of the material as possible from the pores of the wood. Sandpaper the surface thoroughly, clean up and stain.

Shellac and wax on old wood can be removed by coating with denatured alcohol and scraping. Coating the surface with a strong sal soda or washing powder solution of water, letting it stand a few minutes and then scrubbing with a brush will remove these finishes. Turpentine will remove a thin wax coating.

For old work penetrating oil pigment stains or penetrating aniline oil or spirit stains are needed. And it is usually necessary to use a paste filler on old work as well as on new, if the stripping off of the old material has been well done.

On cheap work ordinary pigment oil stains and varnish stains are often used. The wood, however, is painted one or two coats to dry flat and of a ground color which helps the stain to accomplish its effect. Such ground colors as light tan for oak effects and light reddish tan or pink salmon for mahogany effects are used. Then while the oil stain is wet a dry duster or flat wall brush is drawn through the stain to make marks which look like wood grain—the ground coat shows through the brush marks. This is called brush-graining.

Occasionally on old work two or more kinds of lumber will be found in one room. If stain of the same consistency is used on all of the surface, part of this lumber will be darker in color than the balance. In such cases you may have to have two or three pots of stain,—one thick and strong, one moderately thin and the third very thin. By being careful and observing of effects in coloring you can stain such wood to have a fairly even finish as to color all over.

QUESTIONS ON LESSON 33

1. What purpose is served by the staining of wood?
2. Does stain cover or hide the wood grain to any considerable extent?
3. Is it desirable that the wood grain and figure show prominently on stained surfaces?
4. Can you stain a painted or varnished surface? Will it cause the wood grain to show?
5. Which is to be put on first—the stain or the filler?

LESSON 34

NATURAL FINISH, WOOD FILLERS AND THEIR USE

New wood trim to be finished in its natural color must first be sandpapered perfectly smooth, using No. 0 or No. ½ paper. Next it must be dusted and wiped thoroughly clean. Then it is ready to fill.

Paste Fillers: Open grain woods like oak, chestnut, ash, walnut and mahogany require a paste filler to fill the open pores between wood fibres. Close grain woods like maple require the use of a liquid filler or shellac to accomplish the same purpose.

Without fillers varnish coats put on to new wood sink in, giving a pitted effect. Of course if enough coats of varnish are put on and sandpapered the pores of the wood would finally be filled level enough to avoid the pitted appearance. But, obviously, it is cheaper to put on a filler coat.

Birch, while classed as a close grained wood, takes a better mahogany finish if it is filled with paste filler, rather than a liquid filler. This filler brings out the grain and figure contrast best.

Paste fillers are mixed after many different formulae. Manufacturers also supply such fillers ready to use in paste form and they require only a little thinning with turpentine or benzine to make them ready for use.

Most of the wood fillers used today are those prepared ready for use by manufacturers. The prepared wood fillers come in natural color (or transparent), oak, golden oak, antique oak, mahogany and walnut colors.

It is well, however, for the painter to know what composes a good filler,—and how to mix it himself when occasion requires it, or when there is advantage to be gained in cost in doing so.

Fillers are usually colored to tone in with the natural color of the stained color of the wood to be filled. There are exceptions to this rule;—often a novelty effect is wanted. A black filler is sometimes used to make mahogany finish darker; to gain a gray effect on light colored woods, white filler is used and also on gray stained woods. Colored fillers are used on natural finished woods, too.

Many materials are used as a basic pigment for fillers; some of them are: whiting, clay, corn starch, barytes. None is quite so good as silex when it is very fine,—the

water-floated grade is best. Silex is silica, a white, transparent, inert sand resulting from crushing quartz rock. It will not bleach out in the grain of the wood, will not shrink nor bulge out. It is fairly transparent and is easily colored.

Mix paste filler this way, approximately:

3 pints pure raw linseed oil
2 pints Japan drier—not too dark in color
Enough very fine silex to make a stiff paste.

Grind this mixture through a hand paint mill for thorough mixing. It can be mixed in a pot with a paddle, using extra care, if the silex is very fine. When the filler is to be kept on hand for some time in kegs or cans, the silex may separate from the liquid. To prevent this the paint manufacturers add cornstarch to the extent of from 10% to 20% of the weight of the silex, or they add up to 25% of asbestine (silicate of magnesia) to keep the silex in suspension in the liquid.

To make this stiff paste filler ready to use the painter thins it a little with turpentine, but only as much as is absolutely necessary to permit brushing it into the pores of the wood. It is used much thicker than paint.

The color of this paste is correct for some woods to be finished in the natural color, but for others and for stained woods it should be colored as follows, using preferably dry colors, although oil colors can be made to serve:

ANTIQUE OAK

2 lbs. thick paste filler.
½ to 1½ oz. burnt Turkey umber.

ANTWERP OAK

2 lbs. paste filler.
2 oz. drop black.

ANTIQUE MAHOGANY

2 lbs. thick paste filler.
1½ oz. burnt Italian sienna.
½ oz. Vandyke brown.

ANTIQUE MAHOGANY
(Very Dark)

2 lbs. thick paste filler.
½ oz. burnt Italian sienna.
½ oz. rose pink.
⅛ oz. drop black.

MAHOGANY, LIGHT

2 lbs. thick paste filler.
1½ oz. burnt Italian sienna.
½ oz. rose pink.

MAHOGANY ON BIRCH LUMBER

2 lbs. thick paste filler.
2 oz. rose pink.
2 oz. Vandyke brown.
⅛ oz. drop black.

BOG OAK

2 lbs. thick paste filler.
½ lb. Vandyke brown.
4 oz. drop black.

EARLY ENGLISH

2 lbs. thick paste filler.
4 oz. drop black.

FLEMISH OAK

2 lbs. thick paste filler.
1 oz. Vandyke brown.
1 oz. burnt Turkey umber.
4 oz. drop black.

EBONY

2 lbs. thick paste filler.
1 oz. drop black.
⅛ oz. Prussian blue.

FOREST GREEN

2 lbs. thick paste filler.
6 oz. drop black.
1 oz. Vandyke brown.
½ lb. dark chrome green.

FUMED OAK

Usually this finish is not filled, but when it is varnished and filling is called for mix in this way,—
2 lbs. thick paste filler.
4 oz. Vandyke brown.
2 oz. burnt umber.

GOLDEN OAK

2 lbs. paste filler, thick.
1 oz. Vandyke brown.
2 to 4 oz. black asphaltum.

ROSEWOOD

2 lbs. thick paste filler.
1 oz. burnt sienna.
¼ oz. rose pink.
⅛ oz. drop black.

WALNUT

2 lbs thick paste filler.
1½ oz. burnt Turkey umber.

The paste filler, as has been said, is to be thinned to heavy brushing consistency with turpentine. Then with an old, short bristle, stiff brush lay the filler on and rub it well into the open grain of the wood. Brush the filler **crosswise** of the grain first and finish up by laying it off as smoothly as possible with the grain—the same way as the grain runs.

The best filler sets, but does not get hard dry, in about fifteen to twenty minutes. When it has set hard enough to hold fast to the wood—when the coat looks flat and the gloss has disappeared—wipe off the excess filller, using a piece of burlap or machine waste. First wipe crosswise of the grain of the wood, then lightly with the grain, being very careful to avoid pulling the filler out of the pores.

If you permit the filler to set too long, it may not be possible to wipe off the excess material at all. Then it must be sandpapered and scraped; not an easy task. If the filler is wiped too soon, it comes out of the pores of the wood and your purpose is defeated. Watch the filler closely while it is drying. Soon you will learn how rapidly it sets and exactly when to wipe it.

After filling and wiping, allow the surface to dry at least twelve hours; thirty-six hours drying will prove of considerable advantage. Then the filler is harder and more firmly anchored in the wood.

For an extra fine job a second coat of the same filler mixed, possibly, a little thinner is put on in the same manner and wiped off. That will surely fill the wood level and avoid varnish "pitting" as the painters call it when it sinks into the wood pores.

Next fill all holes, nail holes, cracks and joints with putty colored with dry colors to match the filler. Let it dry hard before sandpapering.

Liquid Fillers: Sometimes these are simply paste fillers made thinner with turpentine or benzine. More often, however, shellac, a coat or two, serves as a liquid filler and it is sandpapered down to remove all except that which fills the wood pores.

Liquid fillers are made in many ways. Those made from cheap resin varnishes such as gloss oil, hard oil, sealing varnish and suction varnish are not satisfactory, because they turn white, are too brittle and cloud the finish. A formulae commonly used successfully is:

2 gal. pale interior varnish of good quality
2 qts. turpentine or benzine
1 qt. Japan drier, light in color
5 lbs. well dried bolted China clay.
Mix the clay with a little of the varnish and run it through a hand paint mill. Then add the balance of the liquids.

After the filler is in place and thoroughly dry, the next step in the work is to sandpaper the surface using No. ½ or No. 1. Rub only enough to remove all filler on top of the surface which may cloud and obscure the grain figure. After sandpapering uniformly, wipe off the dust and clean up the room generally to make it ready for the varnish coats.

Brush on two coats of first class varnish—interior coach or spar for wood trim, or floor varnish for floors. Three coats are well worth the little extra cost involved. Allow at least twenty-four hours for each coat to dry and much longer is a material advantage when it is possible. Sandpaper each coat lightly to remove the gloss and the dust before the next coat goes on, using No. 00 sandpaper for the purpose. Be sure the surface is wiped clean before applying each coat.

Specifications sometimes call for one or two coats of orange shellac, or white shellac, and one coat of varnish on floors. It is best then to take one day for the two coats of shellac and varnish the second day, but often the two coats of shellac and one coat of varnish are put on in one day when time is short.

Some specifications call for a dull satin finish gained by putting on two coats of shellac over the filler. The shellac is then rubbed with pumice stone and oil with an old brush. The rubbing method is given in Lesson 35. Another way to gain a dull satin finish on wood trim,

however, is by using flat varnish,—a varnish which dries flat instead of with a gloss.

The longer the job can stand for drying after the last varnish coat has been brushed on the better and more serviceable will the finish be. A wash down with cold water after the varnish is dry helps to harden the surface of first class varnish, but it may cloud poor varnish. On floors furniture should not be rolled around when the varnish is still fresh. Walking is hard enough on new floors.

QUESTIONS ON LESSON 34

1. What is filler used for?
2. Is filler supposed to hide the surface?
3. How much time is needed for drying before a filler is wiped off?
4. Is the filler put on first or is the stain spread first?
5. How is the natural color of filler changed to match the wood?
6. What is paste filler?—liquid filler? Is shellac a filler?
7. How many coats of filler are needed?

LESSON 35

VARNISHING; SHELLACKING; WAXING; RUBBING WITH OIL, WATER, BRUSH, PAD; HAND POLISHING.

Varnishing: The brushing of varnish differs little from the correct method described for the application of flat wall paints in Lesson 19 and for enamel in Lesson 31. The brushing of varnish is quite a different operation than the brushing of exterior house paints, however. The latter are stretched out to the limit in the brushing to make them cover as much surface as possible. Varnish, on the other hand, cannot be stretched or spread out very much; it sets rapidly and so greater care is needed in brushing it.

Varnish is put on with the brush holding about as much material as it will without dripping. A small area of surface is quickly covered with a fairly thick varnish coat. When the brush is fairly empty after transferring the varnish to the surface, spread the varnish out evenly, brushing rapidly **across** the grain; then brush lightly **with** the grain with long, even strokes to even up the coating in thickness and to remove any brush marks, laps and joints in the varnish.

In finishing up a varnish job, the brush should be wiped on the edge of the pot to remove as much of the varnish as possible. Then brush over the surface with this compar-

atively dry brush and you will remove any excess varnish put on. Brush lengthwise of the wood grain, that is, with the grain. If the surface is large, wipe the brush dry two or more times on this final brushing or laying off of the coat. Be sure to make your brush strokes run up to and off the edge of the surface each time, if possible. In varnishing panels, however, you must take a short stroke on each end and a long one in the middle.

It is a good plan to keep your eye on varnished and enamelled surfaces for a while after finishing. Then if an excess of material put on anywhere should cause a run, sag, or wrinkle, or if a fat edge should be discovered, you can smooth it out before the varnish sets hard.

It is genuinely difficult to avoid fat edges—edges of mouldings, panels and corners which scrape off the varnish excessively from your brush while you are "laying off" and smoothing up the final coat.

To rub off a varnish run, after the varnish is dry, wet a cloth and wipe it over a piece of hard soap. Then with dry pumice stone gently rub the run or fat edge. The soap will prevent the particles of pumice from sinking into the soft varnish.

In the winter time, with the thermometer reading anything from zero to forty below, varnish is almost sure to get into a condition known as chilled. Even if kept in a warm stock room, it may be chilled on or going to the job. In this condition varnish is full of tiny specks—gum which has congealed—and these often mar the appearance of what would otherwise have been a good clean piece of varnishing. The best safeguard against this trouble is to either place the varnish tin on top or near a register or radiator; or place the varnish in a pail of hot water for an hour or so. Then it will resume its normal condition.

Varnish works best when the temperature is about 70 degrees; often it behaves badly in the brushing when the temperature is colder than that.

The only way to accomplish a first class job of varnishing is to start with a clean brush, clean pot and a clean surface. Strain the varnish and be sure your duster is clean. Remember that a brush may look clean and yet be far from it—up at the base of the bristles may be quite full of dust and paint or varnish skins. That is often the cause of unclean, rough and specky finished jobs of varnishing and enameling. It is a good plan, too, to clean up brush, pot and duster when a large job is partly completed. Strain

the varnish too, because your brush will pick up more or less dust from working over the surface; then when you dip it into the varnish pot wipe it off on the edge, the dust scrapes off and runs down into the varnish.

Review Lesson 19 about painting a room and follow the same procedure in varnishing.

Shellacking: This material is used much in the same manner as varnish. It dries very rapidly,—dries "short" as the painters say. Two coats can be put on an hour or two apart if necessary, but as with all other paint and varnish materials a better job results from allowing ample time for the drying. Shellac is mixed thinner than varnish and you must work fast with it. It is so thin that you do not have to worry much about laps and joints showing, but exceptional care must be taken to avoid skipping some places.

Shellac is usually mixed by dissolving from 3 to 4 lbs. of shellac gum in 1 gallon of denatured alcohol. Sometimes for a very thin coat to be used for filling only, 1 lb. to 2 lbs. of shellac are mixed with 1 gallon of alcohol. Shellac should be kept in glass jars or copper kettles to exclude light which darkens its color. Keep it tightly corked, too, or it will absorb moisture.

Orange shellac is a bit stronger than white shellac. The latter is the orange shellac which has been bleached. For most wood finishing the orange shellac is suitable. For light woods to have a natural finish the white shellac must be used.

Waxing: A wax finish is not in itself a very durable one, but it does improve appearances and makes the surface much easier to keep clean. There are good painters who believe that a wax finish ought to be built up from the filler simply by placing one coat of wax over another, without varnish or shellac cushion coats next to the wood and filler. The better practice seems to be, however, to put the wax coats over at least one coat of shellac or varnish. Probably two coats of varnish on top of the filler and two coats of wax will prove well worth the cost in the long run. Then if the new coats of wax are not put on as soon as they should be later on, the varnish protects the wood and prevents it from becoming discolored.

Most of the wax used today is made by manufacturers ready to use. There are painters who mix their own wax preparations and it is well to know how this is done. Here are some of the formulae commonly used:

Probably the best wax to use for interior trim is that which has the highest melting point, because it is the hardest after putting it on to the floor. Carnauba wax has a high melting point (185 degrees F.) and is probably the best to use. Melt it in a kettle placed in boiling water—away from the fire. When the wax has melted, add turpentine to it so that when it cools off it will be of the consistency of soft tallow. Then it can be brushed on to the surface.

A formula which is used extensively reads this way:

Take equal portions by weight—about 3 lbs. each of ceresine wax and carnauba wax. Shred it into chips with a knife. Melt the wax in a kettle placed in a pail of boiling water or in hot sand. Then gradually add two gallons of turpentine or less to make the wax, when cool, the consistency of very soft butter.

Another formula: Dissolve 1 pound of bees wax, shaved up, in about one-half pint of turpentine. Let stand over night and then put the pot in a bath of boiling water, away from the fire. When the wax has dissolved, add a little more turpentine to make it as thick only as soft butter. Then add a tablespoonful of hartshorne ammonia. Some call it **XXXX ammonia** or 20 degree—the household ammonia is not strong enough. The ammonia keeps the wax from getting hard.

Paraffin wax can be used in the same manner, but is thought by some to be not so satisfactory.

When wax is to be used on stained wood trim a very little color may be added to make it tone in with the wood.

One coat of wax is sometimes enough for wood trim, but two or three coats may be put on at once or at intervals and are better, especially for floors. Lay the wax on evenly with a brush. Allow it to dry over night and then polish with weighted fleece or flannel brush on floors, or with flannel on wood trim. The wax will not take a polish until it is thoroughly dry.

Rubbing and Polishing the Varnish and Shellac: The dull lustre of a rubbed finish is much more artistic than a high gloss surface, no doubt. Such a finish is popular indeed for paint, enamel, varnish and shellac finished surfaces.

With painted surfaces the dull finish is gained by mixing the paint for that purpose. In the case of enamel the dull finish is gained, usually, by the use of enamel made to dry without gloss—a matt finish—but gloss enamel is

sometimes used and the gloss removed by rubbing. In some instances varnished surfaces are produced by the use of what are called flat varnishes,—those which dry without gloss, but often those varnishes which dry hard and with a high gloss are used and when dry the gloss is removed by rubbing. Surfaces given two or more coats of shellac are often rubbed to a dull finish. This is about the quickest and least expensive way to gain such a finish.

All of these gloss finishes are sometimes given the dull lustre effect by coating them with wax and polishing it with a cloth or brush.

Now as to rubbing methods. This operation is carried on in various ways, depending upon the amount of money and time which the job will afford. The slow thorough-going rubbing method calls for the use of fine pumice stone, water or any non-drying thin rubbing oil (thin motor oil and sewing machine oil are good). The rubbing is done with a felt pad, usually a piece of felt about one inch thick, two inches wide and four or five inches long. The ends are turned over a block of wood and tacked down. See Figures 47 and 70 for illustration.

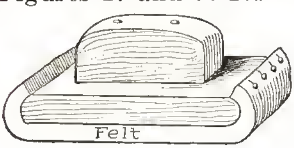


Fig. 70

The rubbing felt is soaked in water. The surface to be rubbed is water soaked, too. It must never be rubbed dry with the pumice stone, or it will be scratched. The wet felt pad is dipped in the dry fine pumice stone powder and transferred to the surface to be rubbed.

The rubbing requires great care and patient labor. An even steady rubbing stroke **with** the length of the grain of the wood is required. Let the rubbing strokes run the full length of the board being rubbed if possible. Aim to do about the same amount of rubbing on every foot of surface; that is, rub about the same length of time on each square foot and use the same pressure on the felt. About six or eight strokes will usually remove the gloss. Try to rub only enough to remove the gloss, the dirt nibs and to smooth up the coat generally. Examine the surface often, after washing or wiping it dry. As soon as it looks dull and smooth, stop rubbing it.

Never rub a surface until the varnish, enamel, shellac or paint is absolutely dry and hard beyond a doubt. Varnish on high grade pianos is permitted to dry one month before rubbing is done.

When rubbing with pumice stone between coats, water must be used instead of oil. The reason for this is that varnish applied over a surface that has been oil rubbed will crawl badly and dry in a very unsatisfactory manner.

When rubbing with water, do not let the work dry up to show the white pumice stone. This can only be avoided by having a good supply of clean water on hand with which to sponge off the pumice and a clean chamois skin to finally dry up the surface. A good supply of clean wiping rags is also needed.

Where the surface to be rubbed is bounded by mouldings, rub the mouldings first, and then cross rub the panels immediately below the top and above the bottom mouldings before rubbing lengthwise of the panel.

In rubbing doors, panels, or any piece of wood trim where the extreme ends are within easy reach, rub directly from one end to the other with a cleansweep of the felt. Keep the surface well moistened by dipping the felt occasionally in the oil or water being used as the work demands it. When the surface has been evenly rubbed and no gloss streaks appear when looking at it with the light reflection on it, wipe off as much of the pumice as possible.

When rubbing with pumice stone, sandpaper or steel wool, one of the very first laws to be observed is that you must keep away from corners, moulding edges, raised carving tops and all projections. This because it takes but one or two strokes on such places to cut through the finish to the bare wood, whether you are working on paint, varnish, shellac or enamel. The gloss is removed from such places by rubbing them with a brush when gloss is to be seen after the general rubbing of the flat surfaces.

After rubbing with water and pumice the only necessary finishing is to wash the surface clean and dry, first with rags and then with a rubbing by use of a chamois skin to polish it.

A surface is rubbed with oil and pumice in the same manner as with water and pumice, except that the oil is put only on the pad,—the surface being rubbed is not flooded with the oil, though it must not be dry rubbed. When the surface has been rubbed it is wiped clean with cloths, then with cloths slightly dampened with benzine. A little dry corn starch is sometimes used to dry up the surface. A final rubbing is given with a dry chamois skin to polish it.

Another rubbing method much used for all these sur-

faces,—one which is cheaper because it gets quicker results —is one which uses a brush to do the work instead of a felt pad. It serves well enough for many jobs, especially for rubbing shellac coats.

For the brush rubbing an old round or flat wall brush is used. The bristles are cut off square and to be only about $2\frac{1}{2}$ inches long. The pumice stone powder is put into a pot of oil and mixed into a "soup", the painters call it. Oil is better than water only because the pumice floats in it to some extent and does not settle to the bottom quickly as in water.

The brush is dipped into the pumice and oil mixture. The surface is rubbed just as if it were being rubbed with a felt pad. With the brush for rubbing the work progresses rapidly and a fairly good job can be done. It is easy to rub mouldings and carved places this way.

Any of the surfaces under discussion can be rubbed to a dull lustre using very fine steel wool, too. No. 0 and No. 00 are used for this purpose.

Polishing: After a surface has been rubbed to a smooth and uniformly dull lustre it is polished by what is called a fine rubbing. In this work a felt rubbing pad is first used, but rotten stone instead of pumice is the cutting material. Oil instead of water is used. After a thorough rubbing with the felt pad a final rub is given on high class cabinet work using the palm of the bare hand and rotten stone in oil.

The cleaning up is done with a soft cloth slightly dampened with benzine. Then a dry rub is given with a soft chamois skin to polish.

QUESTIONS ON LESSON 35

1. What difference have you noted between correct methods for brushing paint, varnish, enamel, flat wall paint?
2. What happens when too much varnish or enamel is put on to a surface?
3. About what temperature is ideal for varnishing. Will varnish flow properly at the freezing temperature?
4. Name the precautions essential to assure the production of a clean surface free from dust when dry?
5. Which is the most durable—shellac or varnish? Which material dries the fastest?
6. What liquid is needed to thin shellac? Will turpentine, ben zine or linseed oil dissolve shellac?
7. Is wax as durable as varnish?
8. How many coats of wax are put on to a floor?
9. What is accomplished by rubbing?

LESSON 36

FINISHING NEW AND OLD FLOORS.

Floor finishing is as a rule no easy task to perform in a way that will give permanent satisfaction to the customer. There are two important reasons for this. In the first place, any material put on to a floor is subjected to severe treatment, to put it mildly. What the action of heels and furniture does not do to destroy the finishing materials, scrubbing with washing powders accomplishes. The other difficulty experienced in finishing floors durably is the matter of allowing a reasonable time for each coat of material to dry thoroughly and then permitting enough time also for the finishing coat to dry before the floors are used.

New Floors: A first class job of finishing begins as soon as the floors are laid, by seeing to it that the carpenters and others keep them covered with building paper to avoid lime and oil stains which may prove difficult to remove, to say nothing about the time wasted in the effort.

The next point to observe is obvious,—thoroughly clean and dust off the floors before the staining or filling is started.

If the floor at hand is to be finished in its natural color, the first step is to brush on the paste filler—after coloring it to match the tone of the wood—as per Lesson 34. Open grained woods, like oak, chestnut and ash require paste filler. Other kinds of lumber used for flooring, such as maple, birch, pine and cypress are all close grained and do not require any filler for floors. When used for cabinet work and for fine house trim these woods are filled with a liquid filler or with shellac. The best finishing of these woods for floors is identical with the oak treatment described, leaving out the filler and with the exception also that one or two coats of shellac and two coats of floor varnish are thought by some to be superior for maple floors to two coats of varnish alone.

Orange shellac is stronger than white (which is the orange gum bleached). The orange shellac should always be used when its darker color is no objection.

The next step in the finishing of the floor in its natural color is to sandpaper the surface, using No. ½ or No. 1 paper and rubbing only hard enough to remove all filler on top of the surface which may cloud and obscure the wood grain and figure. It is not desirable to cover and

hide the natural grain figure. The object of filling is simply to fill the little cracks and depressions level with the tops of the wood fibres. So sandpaper the filler evenly all over and then dust off the surface. If an extra fine job is wanted, brush on a second coat of filler, let it set, wipe off as before. Let it dry, sandpaper and clean up. With two coats of filler, the varnish will never sink into the open pores of oak floors and show what is called ''pitting'' of the varnish.

When the filling has all been done, the surface sandpapered and cleaned, brush on the varnish, allowing at least twenty four hours between coats. The longer the job can stand for drying after the last coat of varnish, the more serviceable will the finish be. A wash-down with clear cold water after twenty-four hours drying helps to harden first class varnish, but it may cloud poor material.

Varnished floors are sometimes rubbed to a dull finish with pumice stone and oil as per lesson 35.

Caution people against rolling heavy furniture around on new floors, walking is hard enough on them.

If the floor is to be stained to even up the coloring or make it harmonize with the color scheme of the room, be sure to make the stain thin and not dark. Remember that the varnish coats will darken the floor some. If a floor appears too dark after staining as per Lesson 32 and 33, it can be made lighter if wiped with a cloth before it bcomes dry. It may be necessary to put a few drops of benzine on the cloth. Wipe the stain evenly all over, to gain a uniform color. Floors are often stained to match the wood trim.

The stain should be put on **before** the filler. The filler should be colored with the stain before brushing it on to the floor.

Floors are stained in the same manner and with the same materials and tools as are used on other wood trim interiors.

Waxing Floors: A wax finish is not in itself a very durable one but it does improve appearances and makes the surface easier to keep clean. There are good painters who believe that a wax finish ought to be built up from the filler by simply placing one coat of wax over another, using two or three coats, with no varnish or shellac cushion coat. Such a method has its advantages, but when the wax becomes worn through, the wood may become stained badly by the travel over the floors; whereas a coat of varnish

gives protection against such stains when it is put on before the wax coats. Probably the most common method followed in the waxing of floors is to lay on a coat or two of first class varnish or shellac followed by the wax coats.

For the details concerning the waxing methods, materials, tools, etc., see Lesson 35.

Oiling Floors: The most serviceable finish for maple and birch floors, especially in offices, factories and in such places as are subjected to the constant travel of many feet is oiling.

Many oil and wax preparations are offered as floor oils by various specialty manufacturers, but it is doubtful if you can find any mixture which is better for this work than good boiled linseed oil with a very little turpentine added. Also a little hot beeswax or paraffin mixed into the hot oil helps greatly to make a good finish.

Brush on the oil while hot if possible, but only after the floor has been made clean and dry. Apply the oil generously and if an excess is put on, wipe it off with cloths after a few minutes are permitted for soaking in. The cleaning of an oiled floor is easily accomplished. A mop moistened with some of the oil is used for wiping up the dust and dirt which accumulates on the floor. Oiling will darken the color of the floor.

An oiled floor can be waxed and, of course, if it is scrubbed often, the oil will be removed. It is not advisable to oil a hard pine floor, as it darkens the color very much and hides the grain figure.

Refinishing Old Floors: Floors which have been revarnished as often as they need it, that is, before the wood becomes bare and dirt stained in many places, usually require little more preparation than a good washing with soap and water. Then a coat or two of first class varnish brings back the uniform color and gloss.

Many floors, however, are subjected to hard usage for a long time after their owners decide that they need refinishing. By the time it is determined that something must really be done about it, the bare places are considerably stained with dirt and heel marks. They never will come back to the uniform color of the balance of the floor without bleaching. In extreme cases it may be necessary to scrape these stained places with a carpenters' scraper. Usually it is necessary simply to sandpaper these spots, bleach them out, coat with shellac once or twice and then they will match up the general color of the whole floor when

the varnish coats are put on all over the floor. When there are many badly stained places, it is often advisable to strip off all of the varnish on the whole floor, bleach the stained places and then supply a coat of thin shellac over the whole floor before the varnishing begins. This evens up the color. Sometimes such a floor is given a coat of thin stain after the bleaching and that, of course, gives a uniform color to the whole floor.

Stripping Off Varnish: Removing all of the old varnish from a floor is as a rule most satisfactorilly done with one of the patented liquid varnish removers. Follow the directions given on the can by the manufacturer. Various mixtures of such chemicals as caustic soda, sal soda, chloride of lime and the like would remove the varnish sometimes, but these substances stain the wood to a fumed oak color. In fact, they are used for producing fumed oak finishes. Much varnish can be removed with steel scrapers, sandpaper and steel wool, but too much labor is required, as a rule to do it this way.

In using liquid varnish removers on floors, be very careful not to let the liquid run into electric floor plugs. The liquid removers are inflammable. Fires have started by having varnish remover get into floor plugs and igniting by establishing a short-circuit.

Washing Floors: When all varnish has been removed, a thorough scrubbing is necessary. Often it is more needed than bleaching. Provide a pail of hot water with soap and a little sal soda or washing powder in it. Have a large roll of coarse steel wool on hand, No. 2 or No. 3. Dip the steel wool into the water and then scrub the floor with it. Use plenty of water. When the dirt has been loosened up, rinse it off with clean water on a sponge from a second pail of clear water. Wipe the scrubbed places as dry as possible with the sponge—squeeze the dirty water out of the sponge each time into the pail having the scrubbing water in it. Scrub one square yard of the floor after another in this manner.

Bleaching Floors: After scrubbing the floor, it is customary to bleach out the color with oxalic acid. You can secure this acid from drug stores and from paint supply stores more economically in dry crystal form. Dissolve as much of the acid in a pail of water as the water will take up (about 1 lb. of oxalic acid to 1½ gallons of water); in other words, make a saturated solution. Sometimes a little vinegar or acetic acid is added to this bleaching solution.

too. Keep the water hot while adding the acid and brush it onto the floor while it is still hot. Let it dry over night, preferably. In theory the acid ought to be neutralized soon after bleaching by brushing on a coat of ordinary table vinegar. In actual practice few painters do it. Whether the acid shortens the life of the varnish seems never to have been proven.

At this point it is customary to sandpaper the dry floor, wipe up the dust and then the surface is ready to varnish. It is decidedly injurious to the painter's health to breathe this oxalic acid dust. The drying acid forms a thin coating on the floor. A better way is to wipe up the acid with a damp cloth before sandpapering. Do not use water for this or it may stain the floor,—use a few drops of benzine on the wiping cloth.

Bleaching solutions are more successful on some woods than upon others. Some stains yield to one bleach and not to others. When bleaching maple floors the bleaching solution is often made by dissolving in the water ½ oxalic acid and ½ tartaric acid, making a saturated solution—all the acid crystals of both kinds the water will dissolve. Rust spots may require scraping with a steel scraper or pieces of broken glass. The same is true of some other stained spots in woods.

To bleach aniline stains, apply a strong solution of chloride of lime in water, let it stand half an hour and then wash it off with clean water. Then use the oxalic acid bleaching solution described. If the stain does not bleach out after this treatment, apply a water saturated solution of tartaric acid; then wash and bleach with oxalic acid as indicated.

Rust stains as a rule yield to one of the above bleaches. If they do not, then a diluted water solution of hydrochloric acid or of citric acid will probably bleach the spots. Use the oxalic acid treatment after all of the above bleaches.

Following is a bleaching formula which is considered very good by many. It is often used successfully even when the old varnish has been removed from the wood with lye. The improvement is thought to be in the addition of the alum:

> One pound of oxalic acid incorporated with one-half pound of powdered alum; dissolve with what water is needed to take up all the acid crystals and alum powder. This should be applied hot immediately after scrubbing the floor with a strong alkali soap, as the bleach works directly upon the alkali in the soap

In the refinishing of bleached floors care must be taken to make a perfect job, especially if the floor is to be filled or stained. It is often then difficult to avoid producing a spotted effect. After thoroughly cleaning and drying the surface bleached, do not sandpaper immediately, but first apply coat of thin shellac—reduced with alcohol to about half the consistency usually used. Permit about twenty-four hours for drying, or longer. Then sandpaper and follow with the staining, filling and varnishing as required. The shellac, be it ever so much reduced, will harden the wood fibres and then the sandpaper can cut them off short, making a smooth surface. The softer parts of the wood absorb the shellac to some extent, thus preventing the stain or colored filler from accumulating in those parts, making dark spots which cloud the finish. It is important to use only pure shellac for this, not substitutes or poor grades of shellac.

When the varnish on a floor is good everywhere except in a spot or two in front of doors, it is not necessary to strip off the old varnish from the whole floor. Scrub the bare spots clean as described, and if necessary bleach them. When the floor is thoroughly dry, touch up these spots only with a coat or two of orange shellac. Let the shellac dry and sandpaper it. Then clean up and varnish the complete floor. Orange shellac is better than varnish for this touching up work on bare places because it has just enough color to make such spots match up perfectly with the balance of the floor.

Wood Fillers: It is seldom that an old floor requires refilling. If it should be needed, if the old filler is washed out of the wood grain, refill the wood the same as a new floor. See Lesson 34.

Varnishing Floors: It is pretty generally agreed that two or three coats of first class varnish after filling is better than any other finish. Then waxing and polishing gives a finer surface finish and the whole makes a durable job. See Lesson 35 for further information.

Maple floors are the most difficult of all to keep covered with varnish when they are given even fairly constant and hard service. The grain of this wood is so close and the wood so hard that varnish gains but scant anchorage. Many good painters believe that a coat or two of orange shellac followed by two coats of first class floor varnish constitutes the best finish for maple floors. Shellac is not a good material for the top coat;—It is too soft and water turns it white.

Soft Wood Floors: Up to this point what has been said refers chiefly to hardwood floors,—they are in the majority. Hard pine and other soft wood floors must be reckoned with also. They are usually finished in their natural color by putting on two coats of floor varnish,—no stain and no filler. They can be stained and are better for having a coat of thin shellac first for a filler before the staining.

Crack Fillers: Pine floors and others often open up enough in drying out to leave quite large cracks between boards and joints. These must be filled before a presentable job can be done.

Clean out all the cracks as thoroughly as possible, then fill them with a putty made by adding dry white lead or dry whiting to lead ground in oil just as it comes from the factory in paste form in the keg. A little hard rubing varnish or floor varnish and a few drops of linseed oil help to harden the putty and anchor it firmly. Fill the cracks to a little above toe boards and when dry cut the putty down to the floor level with sandpaper.

Large cracks may be filled with a mixture of fine sawdust, a little fine whiting, glue and water. Fill to above the level of the boards, using a putty knife. When dry, plane the filler down level or sandpaper them level.

Still another crack filler commonly used is made by adding dry plaster of Paris to a little floor varnish to make a stiff putty. It sets slowly and becomes very hard when dry. Two fillings may be necessary for large cracks,—the first filling may shrink.

Painting Floors: Old floors which have been painted, and those finished in natural color and varnished which have become discolored and damaged so they no longer look well, may be durably and attractively painted.

Wash such floors well, let dry and then putty all cracks and deep scratches. When the putty is dry, sandpaper the whole floor and clean up. Next, brush on a coat of ½ white lead and ½ zinc, colored to suit and thinned mostly with turpentine. Use enough linseed oil to bind the paint, usually not more than one fourth oil to three fourths turpentine for floors painted or varnished before. The second coat of paint should be mixed from ½ white lead, ½ zinc oxide, color, boiled linseed oil and a little first class floor varnish. A pint of varnish to the gallon of paint is enough, less will do. Thin the varnish a little with some of the turpentine before adding it to the paint.

If the newly painted floor is to be varnished, mix the

paint differently. The first coat should be mixed with white lead, color, turpentine and a very little boiled linseed oil. The second coat, mix with white lead, three-fourths—zinc oxide, one-fourth, color, turpentine and no oil. This will dry flat. Two coats of good floor varnish and waxing will complete a durable job.

When more than a very small amount of oil is used in paint which is to be covered with varnish, an alligatored, cracked and crazed appearance is likely to be the result after a time. This because linseed oil makes a paint film which is more elastic than the varnish coats. Then when the wood expands and contracts with temperature changes, the paint film and the varnish film expanding to different degrees, pull against each other. The varnish being the harder, it breaks, crazes and cracks. This action is most commonly noticed on grained window sash which have been varnished.

When you are expected to refinish a soft wood floor to have an oak color, it can be done in two ways. The best one, when it is possible to use it, is to clean and bleach the floors which have been finished in their natural color without paint. Then stain them with an oak stain, varnish and wax in the usual way. The second way to finish these floors and those painted before is by the brush graining method.

Graining.—The definition of this word as applied to the painting trade, is, "Painting in Imitation of Wood"; in other words, the skillful grainer tries to make a correct picture of the grains of wood. In order to become expert as a grainer one must first have a natural talent for the work, then he must cultivate that talent under the best instruction he can obtain, always carefully and diligently studying the grains of the various woods used in modern dwellings. If unable to study under the tuition of a good grainer, the student may obtain abundant information about tools, colors and methods of working from several books published on this subject written by men who have spent many years in graining for the trade.

The beginner will be wise if he refrains from making his early attempts too ornate; cultivate modesty, and only introduce figured work when you feel it bears some resemblance to the figures in the wood you are trying to imitate. A well executed piece of combing or plain graining is superior to a poor attempt at figured work.

Brush Graining: The finish which is commonly thought of as graining today is not real graining, but is more

properly called brush graining. Real graining reproduces the grain figure of the wood so perfectly that only an expert can detect it from the natural finished wood.

The brush graining used today can be accomplished much more rapidly and in most cases for floors it serves quite as well as a more artistic job of real graining.

The first step in brush-graining, after the floor has been made clean and dry, and after all cracks have been filled, is to lay on a ground coat of paint mixed to dry without gloss. Mix it with white lead, zinc, turpentine, a very little boiled linseed oil, (not more than one fourth). Tint to a light cream color, using raw sienna. Brush this coat on and let it dry hard. Then if the old surface is not pretty well covered a second coat of this cream ground color is needed; have it dry flat also.

The next coat is to be mixed to an oak color, using raw sienna and a little burnt umber (no lead). Distemper colors (ground in water) are best but dry colors can be used. Use as a thinner for the color cider, vinegar or stale beer. Mix this like any paint and brush it on. While it is wet, take an old worn calcimine brush and stipple or pounce the surface with the **flat** side of the brush,—use it like a hammer. Then take a clean, dry duster brush and draw it along through the wet paint lengthwise of the boards. This use of the brushes will give a grained effect.

You must work fast and do only a small stretch at a time, because this graining color gets dry quickly. It can be washed off with a sponge soaked in vinegar and the surface coated over again if the first attempt does not look as well as it might. A coat of varnish can be spread over this graining work half an hour after completing it. It is better to wait longer. Two coats of varnish are needed for long service, and of course the floor can be waxed.

QUESTIONS ON LESSON 36

1. Why does paint and varnish used on floors have to be very tough, hard and yet elastic?
2. Is any advantage gained by allowing several days for the drying of painted or varnished floors?
3. Is it practical to varnish a painted floor?—to wax a painted floor?
4. What is the advantage in stripping off old varnish and in bleaching a floor?
5. Why is a larger quantity of zinc used in floor paint?

SUGGESTIONS TO THE TEACHER

The first requirement, in ascertaining the adaptability of an applieant for admission to a class where painting and decorating is taught, is to examine the applicant's ability to determine different colors and to guard aganist wasting time of the pupil as well as time of the sehool, if a pupil is eolor blind, or in faet, if he is not rather keen in distinguishing shades and tints. This can be done by seeuring a number of pieces of woolen yarn which are made in all colors and shades and spreading the whole lot out on a table, request the applicant to seleet a "red," a "blue," or a "yellow," after which require him to select the different tints, whieh will quickly show his ability to determine color. This will also introduee the fact to the pupil that color is probably the most important factor of the trade of painting and decorating.

The use of brushes and other working paraphernalia of the trade such as ladders, ropes and staging, as fully illustrated, are only to be learned by practice, and little more can be done at the start than to give a general explanation or demonstration; their usefulness will develop later as they are brought into use.

The next stop before personal practice by the pupil, is to familiarize the pupil orally and by demonstrations with the colors, both primary and secondary, by actually mixing the tints and displaying them—explaining the use of the colors used in their original state, such as red, blue, yellow as well as black, using the color ehart shown in lesson twelve or a guide.

The pupil being led by these slow proeesses to a full appreciation of the importance of color, and the mixing from this point the text-book must be frequently eonsulted, as a very full description of all the different materials used in the trade will be found therein. There should be on hand all these different materials so the demonstration may be complete and intelligent.

The following list is intended to be merely a suggestion of what should be taught—the teacher to judge of that which would apply to his loeal conditions. Complete authoritative information is in the text-book.

Exterior Painting: The proper ingredients and consistency of paints for each coat on woodwork.

Sandpapering, puttying, and shellacing of knots.

The proper ingredients and consistency of paint for each coat on repainting over old paint.

Removing old paint by torch or paint remover.

Staining of woods—dipping of shingles.

Painting of tin roofs, iron and metal of all sorts.

Painting of new brick work—painting over old paint on brick work.

Painting on cement or concrete.

Oiling of red press brick.

Flatting of brickwork and lining.

Interior Painting: The ingredients and consistency of the first and subsequent coats in preparation for the various finishes required, such as: Enamel—grounds for graining—or finishing in white or tints—sanding woodwork—puttying and general preparation.

Finishing in enamel—flat or gloss.

Preparing plaster—new or old for painting, cutting out of cracks and pointing up, stippling—finishing walls in gloss—flat or enamel.

Floor finishing—either new floors or removing old finish and refinishing.

Sizing of walls and its purpose.

Starching of painted walls.

Hard-Wood Finishing: This department particularly requires demonstration of actual work and the panels of different woods as shown on preceding pages are quite necessary.

The characteristics of the different woods are fully set forth in lesson twenty-nine.

The different finishes of these woods by the process of filling or staining as well as by a gloss or flat finish, or rubbing with pumice is quite varied and is very fully set forth in the lessons covering wood finishes and stains.

This department includes:

A.—Filling and staining of wood.

B.—First coat of varnish.

C.—Subsequent coats of varnish and sandpapering same, preparatory to finishing coat.

D.—Rubbing of varnish finish.

A.—Staining of wood to be finished in wax.
B.—Shellacing wood so stained.
C.—Waxing woodwork.

A.—Water staining.
B.—Acid staining.
C.—Analine dye staining.
D.—Oil staining.
E.—Potashing mahogany.
F.—Preservation and finish for these stains.

A.—**Refinishing Old Wood:**

A.—Revarnishing old surfaces.
B.—Sandpaper and prepare surfaces.
C.—Remove old varnish.
D.—Prepare ground.
E.—Apply coats as specified for new work.
F.—Use of sandpaper.
G.—Use of scrapers.
H.—Use of steel wool.
I.—Use of varnish remover.
J.—Use of torch.

INTERIOR DECORATING

As this department includes the art of designing, sketching and drawing, the application of which must necessarily be preceded by instruction in the work of preparation of surfaces and a thorough knowledge of color mixing, a very careful cultivation of the ability shown by a pupil to draw or design would be very advisable.

This department includes:

Preparing of New Hard Wall Finish, Cleaning, Cutting Out Cracks and Pointing Up.

A.—Priming coat, composition of same.
B.—Two (2) coats, composition of same.
C.—Three (3) and four (4) coats, composition of same.
Stippling of last coat and application of each coat and time necessary under ordinary conditions for drying.

Sand finish Walls or Stucco:

A.—Cleaning and pointing up.
B.—Sizing, glue, alum varnish and shellac.
C.—First coat, composition and application.
D.—Second and third coats, composition and application.

Painting Over Old Walls:

A.—Washing old surfaces, scraping blistered paint.
B.—Removing old paint if necessary, burning off or using liquid remover and neutralizing effect of same.
C.—Priming for repainting.
D.—Sparkling wall and touching up.
E.—Two and three coats, their composition and application.
F.—Wall finished in gloss.
G.—Wall finished in flat.
H.—Wall finished for enamel.
I.—Enameling walls.

Sizings and Their Purposes:

A.—Glue, alum, varnish, starch, sugar, molasses, alum and soap.

Flatting Wall Over Finished Coating:

A.—Sour milk, wax, starch.

Glazing:

A.—Glazing wall with transparent stains, gloss or flat. Stippled with brush, cloth, sponge, burlap, etc., as effect requires.
B.—Glazing with opaque colors.

Decorating Walls:

A.—Drop border.
B.—Panel stenciled or stripping.
C.—Wall stencil, two tone or damask effect.
D.—Two or more colored stencils.
E.—Hand work and flowers.
F.—Gilding on oil paint.

Making a Design on Layout of Decorations:

A.—Making of a detail pounce.
B.—Perforating pounce.

C.—Applying pounce to stencil paper.
D.—Preparing of stencil paper.
E.—Cutting of stencils.

Bronzing:

A.—Mixing of bronze for wall work over paint.
B.—Priming metal for bronzing.
C.—Sizing and dry bronzing.
D.—Bronzing metal.
E.—Preserving bronze and decorating same.

Metal Leaf:

A.—Sizing and preparing surface for metal leaf.
B.—Dutch metal leaf and machine.
C.—Aluminum metal leaf and machine.
D.—Gold leaf.
E.—Preparing same for decoration and glazing—also preserving same.

Calcimining:

A.—Washing off old calcimine.
B.—Preparing surface and pointing up.
C.—Cutting cracks and filling in.
D.—Preparing cracks.
E.—Mixing hot water calcimine, straining and chilling.
F.—Mixing cold water calcimine, straining and chilling.
G.—Mixing calcimine from whiting.
H.—Boiling glue.

Sizing for Calcimining:

A.—New walls, glue, shellac, and varnish.

Applying Calcimine:

A.—Ordinary.
B.—Rough finish.
C.—Stippling.
D.—Blending.

Adding Color to Calcimine:

A.—Soaking colors.
B.—Very dark colors where no white, or very little white, is used.
C.—Binding of colors when necessary.

The Equipment Necessary for a Class Where House Painting and Decorating Is Taught

The class room should, if possible, be equipped as shown in the accompanying plan, well-lighted from skylights above, and well-ventilated. Colors cannot be properly understood nor made in artificial light, and paints will not dry nor act properly in a room unless it is well ventilated. The partitions shown on the plan are built of lathe and plastered, giving home conditions as near as possible.

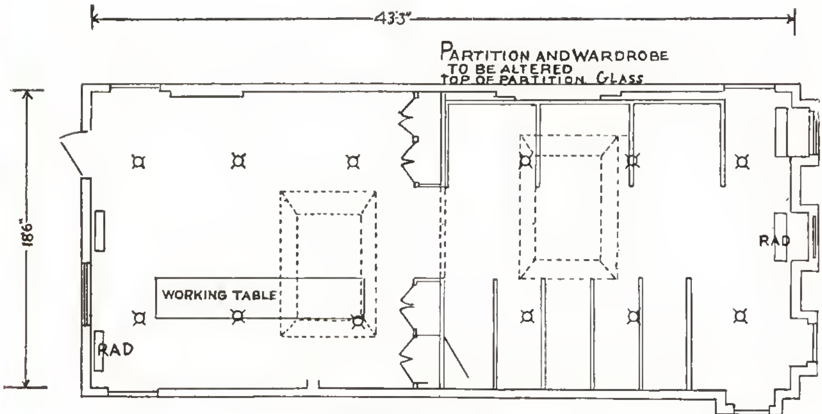
Individual lockers should be provided each scholar, and he should be required to keep his clothes in the locker when in class, and his overalls therein when absent.

There should be boxes constructed of proper width and depth for holding the brushes when not in use, the brushes suspended in oil.

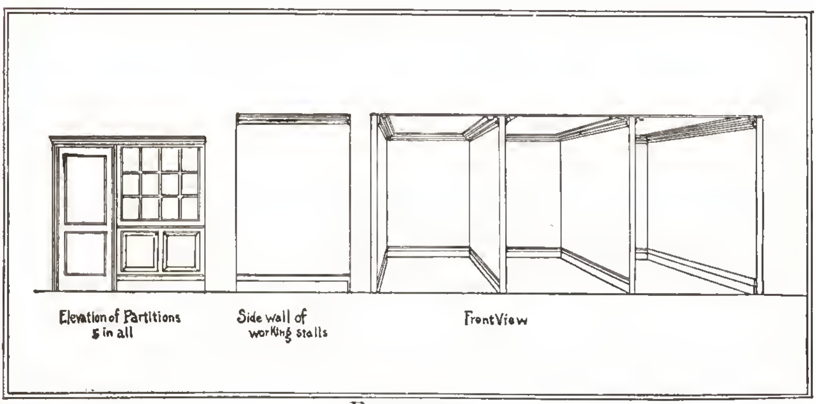
If it is not possible to provide a full swinging stage outfit of stage, falls and hooks, then the different knots employed by a painter can be taught by use of a piece of rope, but rope of 5/8" dimensions, and an ample supply should be provided. The subject is treated very fully in lessons number four and number five.

Beginning on page 167 to 176, there are illustrated panels of the different woods. It is very strongly recommended that in starting a class the panels as shown be procured about one (1) foot wide, three (3) feet long, and about one (1) inch thick. These panels will serve many purposes. They will serve to familiarize the scholar with the wonderful diversity of the grain and color of the different woods and how the grain and colors are brought out by our trade. They will serve as samples for the art of graining, and they will serve to demonstrate generally upon the art of hard-wood finishing. These panels would not cost much money, but they would be of very great value, as after being demonstrated upon the surface could be planed off, and we have a new surface.

But, as a suggestion, where the logical process of bringing up the correct finish of a piece of hardwood was explained to a teacher—filling, shellacing, varnishing, rubbing, etc.—the educator's response was, "You cannot teach the young by logical processes; you older men know the logical processes, but you must also teach the young by psychological process; you must show the boy what



FLOOR PLAN OF CLASS ROOM.



ELEVATION.

he would have gotten had he not filled that panel before varnishing it." The educator was unquestionably right. Would it not be a real lesson to prepare one-half of these panels and continue the finish on the other part without proper preparation, showing the result obtained on the same piece of wood by starting properly and starting improperly?

In the following list mention is made of all materials needed, the purpose being to completely equip the class-room so that the trade may be taught in its entirety. Specializing is strongly advised against. Quantities are not given, as that would be governed by the number of scholars:

Scaffolding—Illustrated as described in Lesson 4, pages 27 to 39:

Extension planks.
Ladders—different kinds.
Swinging stage (block and falls).
Set of roof irons.
Set of hooks.
Stirrups.
Swinging stage and guard rails.
Ladder brackets—roof ladder hooks.
20 feet ⅝ manila rope.

Brushes:

The necessary brushes used by a painter are three sets, consisting of the oval brush of Chinese black bristle, chiseled, illustrated in Fig. 5 and the fitch illustrated in Fig. 8. One set is for use in white, one for use in dark colors, and one set for use in varnish. It would be well if each student were instructed with the three sets. Each student should be furnished also with a putty knife, wide knife and duster. This forms with the three sets of brushes and three paint pots the usual journeymen's "Kit." The other brushes needed in a class-room are:

Calcimine brushes.
Wall brushes—4½" and 3" and 2½".
Wall stipplers.
Dusters.
Floor waxing brush.

Materials for House Painting:

White lead in oil.
White zinc in oil.
Lithopone.
Titanium pigment.
Enamel gloss.
Enamel flat.
Flat wall white.
Burnt sienna in oil.
Raw sienna in oil.
Chrome yellow in three shades in oil (light, medium and dark).
Ochre.
Ultramarine blue in oil.
Cobalt blue in oil.
Prussian blue in oil.
Light green in oil.
Dark green in oil.
Drop black in oil.
Brick red in oil.
Venetian red in oil.
Tuscan red in oil.
Indian red in oil.
Turkey red in oil.
Raw umber in oil.
Burnt umber in oil.
Brown pink in oil.
Carmine in oil.
English vermillion in oil.
Red lead.
Turpentine.
Raw linseed oil.
Liquid drier.
Putty knives, broad knives, scrapers, and pointing trowels for all the boys.
Gasoline blow torch (burner).
Putty.
Drop cloths.
Four quart paint pots.
Wire strainers of different mesh.
Sandpaper, Nos. 2, 1½, 1, ½, 0, 00.
Floor wax prepared for use.
Shingle stains (creosote).
Oxide of iron (metallic).

Decorators Materials.

Straight edges.
Triangles.
Plumb bobs.
Pounce bags.
Willow charcoal powder.
Boxes of stick charcoal.
Box of white chalk.
Snap lines.
Roll of manila pounce paper.
Roll of manila stencil paper.
Stencil cutting knives.
Water sharpening stones.
Pieces of plate glass for cutting on perforators.
Push pins.
Pieces of soft carpet to perforate the pounces on bale sponges.
Alum.
Shell glue.
Gilders whiting.
Hot water calcimine.
Cold water calcimine.
Ochre dry (light).
Ochre dry (dark).
Dutch pink.
Light venetian red dry.
Dark venetian red dry.
English vermillion dry.
Carmine dry.
Raw sienna dry.
Raw umber dry.
Burnt sienna dry.
Burnt umber dry.
Cobalt blue dry.
Ultramarine blue dry.
Lamp black.
Permanent green.
Gold bronze.
Aluminum bronze.
Copper bronze.
Bronzing liquid.
Roman gold bronz
Gold leaf.
Aluminum leaf.

Dutch metal.
Gold ruling machines from 1/16″ to 5″ order, according to requirements.
Oil gold size.
Japan gold size.
Gold cushions.
Camel hair dusters.
Cotton for padding.
Plaster of Paris.
Small stove for heating glue (oil or gas).
One pint tin cups.
2½ gallon pails.

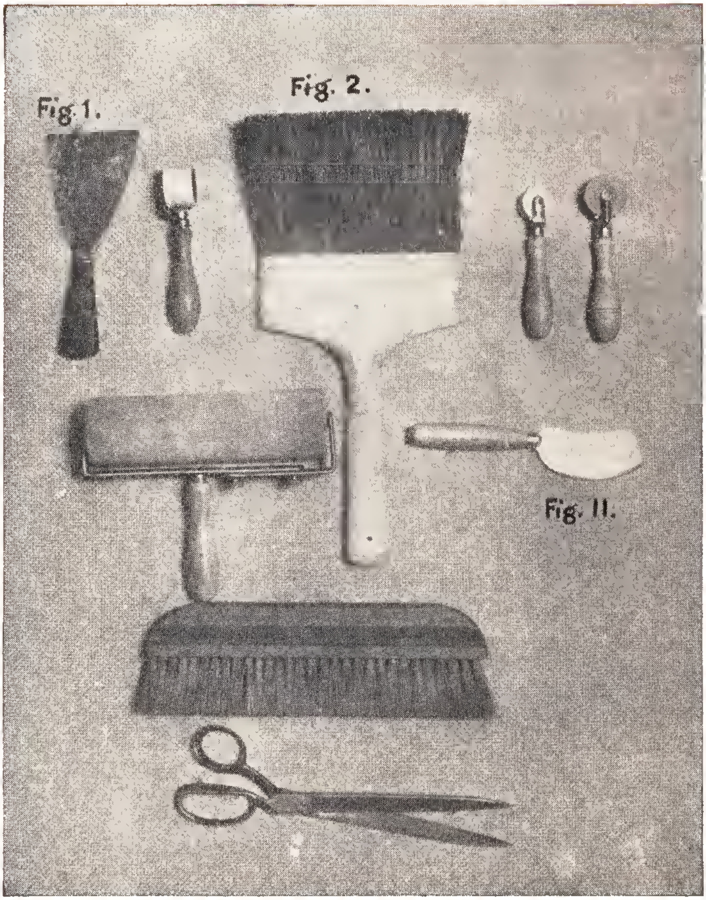
The brushes used in decorating are of quite a large variety, consisting of artists' pencils, calcimine brushes, lining brushes, stenciling brushes, etc.

Hard Wood Finishing Materials:

Paste filler.
Liquid filler.
Varnish of different kind as follows:
  Floor varnish,
  Inside cabinet varnish,
  Flat finish varnish,
  Hardwood finish varnish,
  Rubbing varnish.
Denatured alcohol.
White shellac.
Orange shellac.
Liquid stains of various shades.
Ammonia—full strength.
Oxalic acid.
Coarse pumice stone.
Fine pumice stone.
Rotten stone.
Steel wool, coarse and fine.
Sandpaper—different numbers.
Chamois.
Odd pieces of felt for rubbing, and made up rubbing pads.
Liquid paint and varnish remover.
Bolt of cheese cloth.
"Excelsior" shavings for removing paste filler.

WALL PAPER
AND
OTHER WALL COVERINGS

How to Hang Wall Paper and Other Wall Coverings



A Paperhanger's Kit.

WALL PAPER

Its History and Present Day Development

According to history, wall paper was invented by the Chinese during the early part of the first century, and afterwards introduced into Europe by the Dutch traders.

The first introduction of wall paper into this country occurred about one hundred and seventy years ago; and, although sold as "INDIA PAPERS" was really made in China and was painted by hand on large sheets of paper. This paper in particular was imported especially for the purpose of decorating the walls of a house in Dedham, Mass., where today it may be seen in a good state of preservation.

The claim may therefore be made, that wall paper is of ancient origin. Like many other things created by the ancients, we have no record by which we can determine just the kind of tools that were used by them in the process of preparing and applying wall paper to the surface of walls. We are confident, however, that as simple as may have been the tools or the means used to apply these materials, there was without question a basic principle of thoroughness which is splendidly illustrated by the durability as shown by the lasting qualities of the decorations of the house in Dedham, Mass., as above noted.

Without doubt, they knew how to make paste in the old days. Whatever may have been the methods or the implements used at that time, there have really been remarkable advances made in the manufacture of wall paper and other wall coverings, as well as in the methods of application during the last half century.

Not only have notable achievements been accomplished in the production of wall paper and other coverings, with special reference to quality and variety of materials, patterns, etc., but there also has been a great deal of attention given to the invention of tools and various special implements to enable the skilled workman to better produce perfect work.

From a crude beginning, with a pair of scissors (not necessarily made for paperhangers) a two foot rule, a cloth to wipe the paper smooth, a stump of a calcimine or whitewash brush to apply the paste, and a bucket to

carry the paste, which perhaps comprised the entire equipment thought necessary for the paperhanger years ago; to the variety of devices of today for trimming, the variety of types of brushes used to smooth or sweep the paper, the apparently unlimited variety and number of rollers, various kinds of scissors, folding paste boards, patent and special brands of ready prepared pastes and paste powders and sizings, serves to illustrate the great importance this type of wall decoration has attained in half a century of time.

While it is true that from a crude beginning, the work of the paperhanger has gradually grown in importance, it is also true that it has been so far developed that in some respects it is one of the most important departments of the decorative trade and has reached a very high degree of perfection.

No course of instruction in the art of the decorator can be considered complete unless a working knowledge, at least, is given, of wall paper and its adaptability as practical wall decoration. In fact the more knowledge the modern decorator possesses of the quality and variety of wall coverings obtainable and usable for wall decoration, the better decorator he will be.

GENERAL RULES

While it is taken for granted that the apprentice will have acquired certain habits of order and system in preliminary training, it will not be out of place here to emphasize the need of acquiring in the very beginning, the habit of doing everything in order and regularity of system. Haphazard methods never produce good work, nor will those who fall into such ways ever become expert in any line of endeavor.

In the work of the paperhanger, it is especially necessary to get in the habit of doing the right thing at the right time. It will be surprising to observe how simple a matter it is after all if these principles are adhered to.

There are three things which should be impressed on the mind of the apprentice. They are so simple, that they may seem almost primitive, but nevertheless, they are really basic; PATIENCE — THOROUGHNESS — CLEANLINESS.

With these three principles thoroughly ingrained, other good qualities will fall naturally into line.

Patience will especially be tested. Many differences in quality of materials, will call for patient investigation. Many mistakes which are made from time to time, will, with patience, be turned into valuable lessons gained from experience.

Thoroughness: The apprentice by acquiring the habit of doing everything thoroughly, will find the future road made very much smoother. This very important element of any mechanic's work should always be kept in mind. The first duty is to learn how to do a thing "well." The acquirement of speed will come naturally by practice. Thoroughness in the work of the paperhanger, covers a multitude of things. There must be a right way to begin the day's work. Tools must be kept in thoroughly good condition, as good work cannot be done with poor tools. Good tools should be, and can be, kept in good condition. Thoroughness takes into consideration proper preparation of the surfaces upon which the paper is to be hanged. It certainly is obvious that all labor and expert ability in hanging paper in as perfect a way as is possible, will be useless if care is not taken in preparing walls beforehand. Thoroughness will teach that all of the rough places must be smoothed down with sand paper and all of the holes and broken places must be filled up with plaster, before sizing and papering.

PREPARATION OF CEILINGS AND WALLS

In paperhanging as in other branches of the decorator's trade, good work includes the following—A PROPER BEGINNING, GOOD EXECUTION and FINISH.

Preparation includes getting the surface ready to properly receive the finished decoration whether it be of wall paper or any other decorative material.

Preparation in so far as the Paperhanger is Concerned, consists in so preparing the surface, to properly receive the wall paper or other materials, that they will adhere firmly and without blisters or wrinkles or shrinkage. It will be necessary first to remove or clean any foreign substance or old layers of wall paper or calcimine. It will be necessary to use sand paper, soda, ammonia or

other strong agents to cut hard, nonporous surfaces, before hanging wall decorations. It will also be necessary to have a knowledge of the composition of the various glues and sizings which are in use to coat the walls as a preparation before hanging the wall paper.

Under the head of preparation is included the application of certain types of lining papers which are always advisable for use when hanging certain of the better grades of wall paper as well as specials.

Having in mind only the desire of the apprentice to acquire proficiency in the best grade of work, and proceeding on that basis, the following recommendations are necessary.

Therefore, as the first step in preparation, old wall paper should be removed before attempting to apply the new. It may be perfectly safe to hang the new paper over the old, and to treat the old as a lining paper and thereby save time and expense; but, there is an element of risk therein; as, for example:—The old paper might be perfectly tight and well fastened to the walls, but, just as soon as it becomes moistened and softened by contact with the paste of the new paper, it will raise into many blisters and, when dry, it is likely to curl up at the corners and leave the walls. There are a number of reasons for this. Some paperhangers make the paste too thin and almost to a watery state. The only object in doing this is to enable them to do the work quickly and with as little exertion as possible, (thin paste spreads more quickly than thick paste). They are, therefore, not thinking far enough into the future or caring about it for that matter, to consider that the paste when so thinned will not be strong enough to carry more than one layer of paper. Then again, the paste may have been of such poor quality, that it has lost its strength, and, consequently, when the added burden of another layer or two of paper is added to it, it will curl up and fall from the walls from the combined weight of the several layers.

It will therefore be seen, that for thoroughly good work, it is necessary to remove all of the old wall paper before attempting to apply the new and to use good paste of proper consistency and strength in order to insure good and permanent work.

METHODS OF REMOVING OLD WALL PAPER

How to remove old wall paper or calcimine from ceilings and walls, economically, has long been a problem to the trade.

Where there is only one layer of paper or calcimine, the problem is easily solved, but where there are many layers of paper or calcimine and various coats of sizings, it is a different proposition.

Various types of machines have been invented and patented and in some respects have proved to be an improvement over ordinary methods, but as they all have their limitations, it is safe to assert that we have a long road to travel before a practical improvement is made over the old fashioned method of well soaking the paper or calcimine and then scraping off with a painter's broad knife. (Fig. 1.)

In the removal of old wall paper the method of procedure is as follows:—First provide two step ladders and a plank. Place the plank upon the ladders so as to provide a scaffold upon which to work. While working from this scaffold, start work by wetting the top of the walls around the room, when this is accomplished, wet the lower section. The wetting process is, of course, with water and the water is applied with a broad calcimine brush (six or seven inches wide, Fig. 2). If possible, two men should work together. While one is wetting the upper walls, the other can follow with the lower stretch. By the application of water several times around the room (it will improve things if the water is warm; not boiling hot), the paper will become well soaked by the time the third application has been made and can be easily scraped off. If it so happens that there are so many layers on the wall that the water does not soak through to the last coat very fast or fast enough, strip off all that will come off and then soak the last layers again. This will be found to have more speedy results, with less damage to the walls, than is the case when not enough water is applied and the workman has to resort to digging it off and consequently injuring the wall surface and unnecessarily raising blisters on the hands and doing tiresome work in the bargain.

There have been occasions where a little ingenuity has been practiced by filling the room with steam for several hours, to soften up the paper. This is known to have

worked so well in some cases that the paper has fallen off without scraping. As in the case of any new machine, this method has to be used with rare judgment, inasmuch as the excessive moisture and steam is likely to cause other damage to cabinet work, etc.

REMOVING VARNISHED PAPERS

It will sometimes happen that it becomes necessary to remove varnished tile papers or other painted papers. It will, of course, be readily understood that ordinary soaking with water, will not be sufficient. It will be necessary to remove the gloss of the varnish or the paint before the water will have any effect. Various methods are used. The first step is to rub down the surface with coarse sand paper (No. 2). Rub the wall paper just enough to scratch the surface to enable the water to get through. Add some ammonia or washing powder to the water and then apply in same manner as above advised for ordinary paper. There is room here for the use of the workman's judgment, as every job will present different problems. For instance, if the woodwork of the room is to be overhauled and painted after the other work of cleaning is completed, the strength of the ammonia or soda solutions, may be increased; but if the wood work is to be saved and protected, it will not be safe to use anything but water. For the same reason, ammonia and soda will have to be omitted if there is a fine hardwood floor to be protected. Water cannot be applied without running down on the woodwork and floor and if there is any strong alkali or ammonia in the water, damage will, undoubtedly, result to both the floor and the woodwork.

It will be gathered from the above that the success of the work depends on thoroughly soaking the paper and the removal with a painter's broad knife or wall scraper, while the paper is thoroughly wet. If this course is pursued, the scraping will be found a simple process. To scrape, as in everything else in serious business, proceed with system and as in the case of the wetting process, start at the top. There is no particular advantage of scraping one way over another. The correct method is to start at the top of the walls and scrape from right to left for a distance of about three feet and after scraping off to the depth of say a foot, then scrape downward for about the same distance and make the swing from the

shoulder and not the wrist or elbow. Use the shoulder stroke as much as possible and save fatigue as a result.

REMOVING CALCIMINE

When good work is desired, the paperhanger should never attempt to paper over old calcimine or calcimine of any sort. It is too much risk as the paste is practically sure of lifting off the calcimine and thereby causing the paper to fall off. The calcimine should, as a matter of course, be removed, and the process is as follows:—Wet the calcimine with calcimine brush as described for the paper, but only a stretch at a time. The calcimine will soak up the water quickly and will dry too soon to advise the wetting of the whole room. After wetting a stretch (four feet wide by twelve feet long) the calcimine can usually be removed with a wet sponge. When using the sponge, be sure to frequently wash the sponge out in water to remove the accumulation of calcimine, as well as to have a clean and wet sponge for effective work. If the calcimine does not remove easily by this process, because of non-absorption of the water, it will have to be scraped off in much the same manner as the wall paper. As this is a messy job and the wet calcimine drops and makes hard patches on floor and furniture, it will be advisable to have a light pasteboard box or pail in the left hand to catch the scrapings.

This brief description of the removal of papers and calcimine will be sufficient to enlighten the apprentice as to the need of and the method of procedure. Every job presents different problems, which will call for the exercise of judgment and the application of common sense. The methods here outlined, will form a good foundation for further experience.

PREPARATION AND APPLICATION OF SIZINGS

For the preparation of all surfaces, there must be an application of glue size in some form or another, in order to better insure the adhesiveness of the paste which will be used to apply the paper. All wall surfaces are more or less hard or nonporous and the use of glue size presents a surface which will make up for the defects in the wall. It must be understood though, that there is no uniform standard size that can be safely used for all con-

ditions. As in other departments of the trade, there are many patented preparations on the market and some of them are good, especially when the directions are followed. Nevertheless it would not do for the apprentice to be trained to depend on PREPARED MATERIALS. He must know (to be master of his trade) how to make the different preparations.

GLUE SIZE

For an ordinary plaster wall where the paper has been removed and the wall well rubbed down and washed off, an application of a weak size, will make the walls ready for the paper. The glue size is made as follows:—Soak a half pound of flake glue in water. The glue is placed in a pot or pail and covered with water. After two hours, the glue which by this time has swelled up and is heavy from the water which it has absorbed or soaked up, is lifted from the vessel which contains it, allowing the surplus water to drop from it, while lifting it, and placed in the glue kettle and boiled over a slow fire. It is stirred while boiling to prevent it being burned on the bottom of the pot. When it is boiled until there are no lumps and it is all one mass of the consistency of heavy molasses, pour it into half a pail of hot water and then stir the whole together. You will then have a size, the strength of which will have to be tested as follows. Place a little of the size between the thumb and forefinger and feel if it is sticky enough to have what is known as "tack." If it is a light weight paper, there is need for only a slight degree of tack or "pull" but if it is a heavy paper, it will have to have more "tack" or "pull." Exact proportions cannot be given because of the varying degree of the strength of glue; but the instructions here given will be found safe.

When the paper is of heavy quality, the size will be improved if it is made "elastic." This elasticity is effected by the addition of brown sugar or "old fashioned molasses." This addition of molasses gives to the size an additional degree of stickiness and prevents the glue size from becoming a "skin" which some papers having a peculiar quality of curling tendency, would pull from the walls. To half a pail of size as above instructed, add about a half pint of molasses while the size is hot.

SIZE FOR PAINTED OR VARNISHED WALLS

If the attempt is made to hang paper on a painted or varnished wall without first sizing it, failure will undoubtedly result. The pores of the walls all being filled up with the paint or varnish, the paste will not cling; with the final result that the paper will peel off from its own weight.

All walls of this nature should be rubbed down with No. 2 sand paper and then sized. A very good size for this purpose is composed of glue, water and molasses. The glue is prepared by soaking and boiling as above advised and when melted, it is mixed while hot with an equal quantity of molasses (by equal quantity, is meant the liquid state of each). For use, this is thinned down with hot water. It is advised, that before using this or any other size that is diluted with water, that a trial be made of it by doing a small portion of the wall (say about a yard square) and then when it is dry, hang a section of the paper to dry over night. In the morning, try to tear it off. It can then be seen whether the size is the right strength.

Some experts advise that the walls be washed down with a weak solution of water and soda to cut the paint. Experience has proven this a dangerous procedure not only because it softens the paint too much, but because of the damage that the solution causes to the surrounding woodwork, etc. Long experience has shown that the glue and molasses or brown sugar mixed with glue and water, is all that is necessary.

THE MAKING OF PASTE

The making of paste is a very simple matter and one of the secrets of the trade which is very easily mastered; however, many failures are due to the use of improperly made paste, and for this reason, the manufacture and sale of all sorts of ready-made pastes has become a big and profitable business.

Paperhangers' paste is made of flour and water. And, make no mistake about this, the very best of flour is absolutely necessary for the making of good paste. Never make the mistake of buying cheap flour as it will without doubt prove to be very unsatisfactory.

To make the paste, proceed as follows: Fill two good kettles with water and place on the fire to boil. While waiting for this to boil, which, by the way, is two (2) gallons, the flour for the making of the paste can be prepared as follows: Place about a quart of cold water in a good size pail and then pour three and one-half pounds of flour into it, stirring the water while doing so and keep stirring the mass until it is free from lumps. The stirring process is done with a good size stick, or with the hand, the latter being preferable, as you can feel the lumps and break them up more speedily and better than by any other way, and the water and flour will not injure the hands in the least. When this part of the job is completed and the condition of the mixture is such that it is just thick enough to stir and no thinner, the hot water will have by this time come to boiling point and is now ready to be added to the mixture. The stick must be used instead of the hands from now on. Before adding the hot water, make sure that it is "BOILING HOT," and take the kettle of boiling hot water in the left hand, the stirring stick in the right hand. Then stir the paste with the stick in a circular motion, making sure that the stick is scraping the bottom of the pail while doing so. While thus stirring, pour in the boiling hot water and keep on stirring while pouring and watch the flour. If all directions have been followed, you will find by the time that the pail is three-quarters full, the flour has begun to swell into a gelatine-like condition, and when it is all of a transparent-like jelly mixture and there are no streaks of flour, the pail will be brimful of first-class heavy paste. When this has somewhat cooled and a thin skin formed on top, pour into it enough cold water to cover and set it away to cool off. While it can be used hot, it will be better for use when it is cool, and will go further in the work and will slide better on the paper.

If all of these directions for the making of paste are faithfully carried out, it will not be necessary to strain the paste as there will be no lumps.

Some paperhangers say that it is too much trouble to make paste and that it does not pay to take the time, but when you want to be sure of having the best paste for the best work, it is better to prepare your own paste. This statement is not made with the intention of belittling the good qualities of the prepared article, but rather to

strengthen the knowledge of the apprentice and to give him the confidence that knowledge of all the details of the business necessarily will give him.

In very hot weather, it is sometimes necessary to add a preservative to the paste to keep it sweet and from decay. For this purpose add a pinch of alum dissolved in water and stir well into the paste. However, there are some papers the colors of which will be affected by the alum. Most manufacturers stamp their papers with a warning when the quality is of such a nature that this is necessary and the paperhanger will do well to take particular note of such directions.

VENICE TURPENTINE

When hanging extra heavy paper such as Lincrusta, Japanese Leathers or American pressed, Heavy Canvas or Prepared Burlaps, it is necessary to have the paste extraordinarily strong. The addition of Venetian Turpentine to the paste will accomplish this result as nothing else will. Add to the pail of hot paste, one-half pint of Venice Turpentine and stir it well to make sure that it is well mixed in with the paste. This paste should only be used with papers as above described as being of an oily nature, it is apt to strike through in spots if used on a delicate or thin paper.

HOW TO MEASURE FOR AND TO CUT PAPER TO ADVANTAGE

A great many people including the great majority of paperhangers, have the opinion that the principal thing in the work of the paperhanger is to possess the ability to so match the pattern of the wall paper at the joints, that, because of the clever matching of the design it will be difficult to discover where it is joined together. It is the purpose, however, to point out, that, as important as this is, it is by no means the most important branch of the paperhanger's work. There are other branches of his work which count for as much if not for more.

As has been already emphasized, PREPARATION of the surface is equally important and there are some other things of equal importance, for instance: TO HANG THE PAPER ABSOLUTELY PLUMB AND STRAIGHT, so

that the pattern will run level and true. TO KEEP THE SURFACE OF THE PAPER ABSOLUTELY SMOOTH AND CLEAN is an art that only a small percentage of workmen possess; but to those who "KNOW," it is one of the most important elements of the work.

There is the measuring and cutting of the paper to advantage and, when the term to "ADVANTAGE" is used, it means not only to cut the paper so there will not be any undue waste, but also to so cut it, that, because of the study and care that is taken in this respect, the work will produce the best possible effect.

Many paperhangers attack this important branch of the work in an indifferent and haphazard way, apparently having the opinion (if they think about it at all), that it matters little where or how the paper is cut, so long as each piece of paper is cut the same length.

After having given the required attention to the condition of and the preparation of the walls to receive the paper, the paperhanger's next thought should be "HOW TO SO CUT" the paper, that it will come as near as possible to producing the effect that was intended by the designer of a well-planned design, for, let it be known, that all successful designs (from a decorative point of view) represent a great deal of thought and study, as well as expert ability by the manufacturer as to what effect will be produced when a given pattern of wall paper is placed upon the walls as DECORATION. No design is produced in an offhand sort of way, or hurried or careless manner. No one but the designer, colorist and manufacturer, knows just how much time is devoted to preparing designs and colorings for wall papers in order that they may make successful decorations, and it goes without saying that all of the thought and study thus taken, is a great waste of time and brains, if the paperhanger will thoughtlessly cut up the wall paper with no other thought, except to get the paper up on the walls in as speedy a manner as possible. Once the habit is acquired of carefully studying each design before touching it with scissors, there will be no loss of time or quantity of paper hung for a day's work. The paperhanger MUST study each design or pattern conscientiously to determine where the pattern should be cut, in order that the proper finish be made at the top where the paper meets the ceiling, border or moulding, in

the case of a "floral design," if it is possible to do so (and it is as a rule). Florals are always so planned that it is possible to cut through the minor details of the foliage or small flowers or leaves (see Fig. 3), so that the main pattern or cluster of flowers stand out prominently without the mutilation which is more than likely to occur if no attention is paid to this detail.

There are many varieties of patterns which have prominent features or "skeleton" foundations which are very noticeable after several lengths of the paper are placed upon the walls, or when the room is completely papered.

Fig. 3

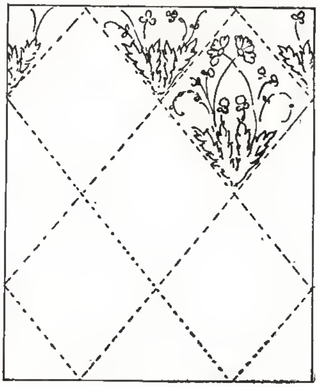


Fig. 4

These prominent features of foundation construction of the design must be detected before the cutting of the paper, if a perfect job is expected. (See Fig. 4.)

Wall paper patterns are divided into several classes, the principle two being Geometrics (set patterns) and Florals. If real good decorative results are to be obtained, the paperhanger must study the pecularities of each to determine just where the design should be cut to produce the best effect. The Geometric, or set design, especially should be very carefully studied and the apprentice should be here assured that the educational results of such study will more than repay for the time and trouble involved. Most of the Geometric patterns are carefully worked out designs, derived from what is known as "PERIOD ORNAMENTATION" and each design has a definite beginning and ending and where it is possible, it is well worth while to study so as to discover which is the top and which is the bottom of a design motif.

DROP PATTERNS, ETC.

One of the first and most baffling of first things to puzzle the young apprentice, will be the frequency with which he will have to use what are known as "drop patterns." In the beginning he will have used the usual straight designs and then suddenly think he has discovered that the paper does not match right, and will at first conclude that the paper is a misprint. He will then find that the advice to study each design with care before cutting was given seriously and for his good. A great deal of paper is wasted annually by the thoughtless and ignorant paper hanger, in the rush to get at the hanging of the paper without due thought being given to the analysis of the design.

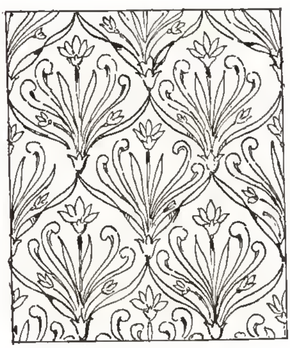


Fig. 5

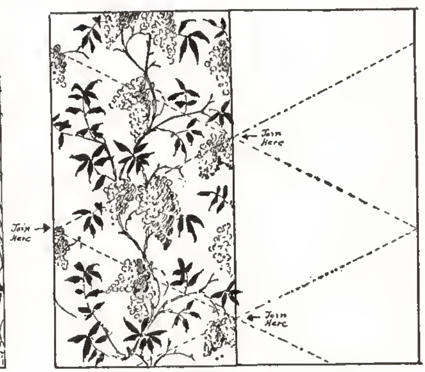


Fig. 6

A "straight" pattern is one where the design matches on opposite sides of the paper (See Fig. 5) and a drop pattern is one where the match of the pattern does not come directly opposite (See Fig. 6). It will be seen by reference to the diagram that by adopting the drop pattern the designer is enabled to get a much larger design reproduced within the limited confines of the narrow width of wall paper at his command.

A great deal of space and time could be devoted to a treatise of this important branch of the work, but a careful study of these diagrams and a conscientious vigilance on the part of the paperhanger in the handling of the many different kinds of patterns which are in constant

use, will enable him to discover all that there is in this branch of the work.

Another reason for carefully examining each pattern, is to prevent the oft-repeated mistake of hanging paper upside down. In the past, it has been quite an easy matter for an inexperienced paperhanger to make this mistake. Some of the papers are rolled in the same manner as certain imported goods, that is, to say, they are rolled in the opposite direction in which American paper is usually rolled, but occasionally, even the American manufacturer will roll the paper in the same manner. It will thus be seen that practice on the part of the paperhanger, in examining very carefully each pattern and each roll of paper will soon make him expert in discovering the top and bottom of the design. The more knowledge possessed of the construction of design, the easier it will be to discover these mistakes. Some manufacturers have adopted a plan by which these mistakes will be quite impossible.

A distinguishing mark is placed upon the margin of each roll of paper which will instruct the paperhanger on this point. This is a very important advantage and will help the paperhanger to carry out the designers' ideas more efficiently.

PAPERHANGERS' TOOLS AND HOW TO USE THEM

The number and variety of tools absolutely necessary in the work of ordinary paperhanging, are few and very simple.

A TABLE upon which to cut and trim the paper, pair or two of SCISSORS, A PASTE BRUSH, PASTE BUCKET, A SMOOTHING BRUSH (OR SWEEP), A TRIMMING KNIFE, STRAIGHT EDGE, A SEAM ROLLER, A MEASURING RULE, A PLUMB BOB AND A CHALK LINE, STEPLADDERS of varying heights and a few sundries such as CHALK, CHARCOAL, PENCILS, ETC.

In addition to the above described tools, every paperhanger should be provided with a suit or two of overalls as well as an apron provided with a good sized pocket in which to carry the tools while at work.

With this assortment in the hands of the skilled workman, it is possible to produce good work with any grade of paper. With these tools, plus expert ability, any kind

of paper or materials can be handled. There are, however, many other types of tools and appliances which have been developed in recent years, to not only make the work more easily accomplished, but which also enables the paperhanger to do better work. There are many of them and they are all good in their various ways, but for the purpose of imparting information and instruction in a simple and direct way, the consideration of many of these improved devices will be taken up in a special chapter of review wherein the advantage of each type will be discussed, not for the purpose of advising the apprentice to immediately add them to his equipment but rather to bring them to his notice, that he may become familiar with them and have them in mind, when confronted from time to time (as he undoubtedly will be) with peculiar conditions. If of an inquiring and mechanical mind, the apprentice will quickly discover the shortcomings of certain tools in his possession and will subsequently bring to mind with due appreciation, the special type of tool or appliance that will enable the work to be done with more ease and with better results.

By reference to page 232, the reader will see quite a collection of tools reproduced. An attempt has not been made to make this photograph comprehensive enough to embrace all that the American inventor has placed on the market, but it will be seen by the variety of seam rollers, smoothing rollers, trimming knives and machines shown, that there are tools enough to cover any emergency.

HOW TO HANG THE ORDINARY GRADES

To hang wall paper in a workmanlike manner requires but an ordinary degree of mechanical ability. The mere trick of hanging one strip of paper after another is quite simple and easily acquired by a person of average intelligence.

If wall paper was a standard product of uniform quality, and without variation in pattern or texture, it would not require much instruction, nor occupy much time in practice, to become a skilled paperhanger.

There is, however, an endless variety of types of paper as well as materials that require that the paperhanger possess, besides natural mechanical ability, a thorough

knowledge (gained from experience) of the peculiarities of these varying degrees of texture, colorings, patterns, types, etc.

It is therefore the purpose of these lessons to provide a course of study and practice whereby the apprentice shall have an opportunity to take up the various departments of the trade in such a way that he will:—

First—Acquire the knowledge which will enable him to become expert in the purely mechanical routine of measuring, cutting, trimming, pasting and hanging; and, second—Learn just what NOT TO DO as well as WHAT TO DO with some of the leading and most prominent of the many materials and varieties of wall paper and special things which are being constantly used in decorative paperhanging.

The purpose is to make the instruction practical and simple and by avoiding the too frequent use of technical terms and unpronounceable names, make it easily understandable to the beginner.

THE FIRST STEPS

The first thing for the paperhanger to do is to set up the paste table or boards, as they are called. The manufactured folding table is, of course, the very best thing that can be provided. Being light in weight and folding up into small space with a canvas carrying bag making it easily portable, it is the right and proper thing. It is, however, possible to do without it. There are certain conditions and rules which must be followed, even in the use of crude implements. If, for instance, the paste table is a temporary affair composed of two twelve inch boards, each six feet long, it will be found adequate for ordinary grades of paper of the average width. These boards, however, must be placed in a particular manner to get uniformly good results. They should rest on two supports of table height, of say about thirty inches from the floor. If two wooden horses cannot be obtained, use two barrels, or two closet or bureau drawers. Be sure to have these supports placed at the right and left of the boards and do not for a moment consider the need of a support in the center, for the following very important reasons: First—There must be "spring" in the table and

a support in the center would prevent this. It will be found when working on the table all day that it is much more agreeable and less fatiguing to paste on a table with springiness in the boards than if they were on a solid foundation. Second—When the paper is being trimmed, it will be possible to make the straightedge grip close to all parts of the paper, if there is spring in both boards and straightedge.

After the table is set up, the next step is to measure the wall to determine the length of paper necessary to be cut. We will say that the wall is ten feet high and the paper is to be cut close to ceiling line. It will be necessary, therefore, to cut the paper so that it measures ten feet, six or more, according to the pattern. There must be at least six inches over and above the finished length of the wall to allow for cutting or trimming off at the top or the bottom.

Then take the rule and determine by measurement just how many lengths of paper will be necessary to cover the walls. This can be determined quickly by using a roll of paper as a measuring stick. If the paper is twenty inches wide, you can quickly discover how many twenty inch widths of paper will go around the walls. After determining this important need, cut up the required number of strips, proceeding as follows:—

Take the roll of paper in the left hand, place it upon the table, still holding it in the left hand, then with the right hand pull out four feet of the paper and let this fall over the right hand end of the table, some of it will therefore rest on the floor, then unroll with the left hand to the left hand end of the table, until you come to the end of the ten feet, six inches, where by the careful analysis of the pattern as before advised, the pattern should be cut so it will produce the best finished effect, for the top. On the first piece that may be cut, it will possibly be longer than necessary, because of the care in getting the right top, but on the second or succeeding lengths, there will, of course, be a uniformity of length, but remember to allow at least (if possible) six inches for waste on top and bottom cutting. It may be necessary to allow a full block (about fifteen inches) for waste. For instance, say the pattern is a fifteen inch block and the wall is ten feet high (equal to one hundred and twenty inches). This will make eight patterns, but allowing for no waste. If

Fig. 7

there is no border to be used, it can be readily seen that there will have to be an additional pattern added to the length, in order to have something to cut off at the top and bottom. It will, therefore, be necessary to cut each length eleven feet and three inches long. Out of a roll, you will get two lengths, with a waste of eighteen inches. As American papers are made in double rolls, you will get four lengths out of the double and a remnant of thirty-six inches left off each double. This remnant can be used for over doors and windows and other small patches.

When cutting up a drop pattern, it will be necessary to proceed a little differently. In most cases it will be necessary to cut two rolls at a time. Take the first length as above described and cut. It may so happen that the cut will come out right for economy when cut off the same roll, but as a rule it requires two rolls (See Fig. 7). It

will be seen by referring to the illustration, that the top of each other breadth or length is different; but this can be overcome by cutting one length off each roll, alternately.

WHERE TO BEGIN TO HANG

There are certain preliminary steps to be taken before attempting to paste or to hang the paper. It must be determined where the first long length of paper is to be placed, as well as some of the succeeding ones. If the paper is an ordinary quality and pattern, it will be necessary to consider only that the paperhanging must begin at the light, that is to say, at the window end of the room, and from there, to continue around one side and then again from the window on the left. The next step is to determine where the two sides will meet, as there is usually a mismatch at this juncture, usually in the most inconspicuous corner, over a door, behind a door, or in the angle of the mantel breast.

When the design is geometrical and prominently centered, it will be necessary to proceed quite differently. In other words, to plan as a decorator, just where to center the design. Usually the prominent places of the rooms are over the mantel and between the windows and prominent walls opposite the mantel, as well as between two doors, especially if the doors are evenly and symmetrically placed on one or more sides of the room. When this is done, it will be necessary to strike a line in the center of the wall and if the design centers on the joint, hang the paper on the line first made, but if the design centers on the center of the breadth or length, make two lines, one in the center of the mantel breast and the other to the right or left of it to the extent of half of the width of the paper. The line is made by first determining the center of the space by measurement and then by use of the plumb line or level, strike off a perfectly plumb line. When working alone, the first mark can be made with pencil or charcoal. At the top and center of the mantel, the plumb line, which has been previously charged with charcoal powder, is hung upon a tack placed upon this top mark and dropped the full length of the wall, and, when it hangs stationary, it is secured by the thumb of the left hand and with the right hand it is snapped to make the mark; then the second mark can be

made by measurement and marked with straightedge and pencil as directed.

Having determined where to begin the hanging, the next steps are to place the paper bottom-side up on the paste table and proceed to paste, fold and trim. The paper must be so placed for the first pasting, so that the top of paper is even with the left hand side of the table and the surplus paper is lying loosely over the end of the right hand side of the table. Have the pail of paste placed at the right (if right handed), slightly to the rear, and placed on a box or chair. Tie a string across the top of the pail to rest the brush on while it is not in use and to scrape off the surplus paste. Thin the paste down in accordance with the weight of the paper, the consistency of which is, of course, hard to describe; but for the general instruction, use the paste as stiff as you can work it, thinning it as little as possible, depending more on your ability to rub it out, rather than having it too thin. If the paste is made according to directions, this will be found quite easy to master and the paste will slide easily and smoothly under the brush. The kind of brush found to be the best for all purposes, is a wide calcimine brush of good quality of bristles. They are quite expensive at the present time, but will wear longer and do better work than any other kind of brush, and, of course, will prove the cheapest in the end. A good calcimine brush will be useful for sizing with, as well as for pasting. Another point worth considering, is that with a brush of this kind and with properly made paste, one good full brushful of paste will be enough for the six feet of paper so that it will not be necessary to make many trips and many dips of the brush into the paste. Proceed to paste as follows:—Dip the brush into the paste and with a full brush start to spread the paste beginning at the back of the paper farthest away from you and with sweeping stroke, apply the paste from right to left; first lay it on freely and then level off smoothly and evenly, carrying off the surplus. In this, as in other departments, study to save steps and motions. A little practice, with this in mind, will soon enable a degree of expertness to be gained which will prove to be of value in this apparently insignificant detail. In pasting one piece of paper be careful not to have the paste flow

over on to the piece which lays directly beneath. The edge of the paper nearest to you should be even with the edge of the board and the brush strokes should be so directed that they will always be brushed out and towards you and approaching the edge nearest to you and when pasting the edge furthest away, care should be taken to hold up the paper with the left hand grasping edge and pasting lightly towards the back of table. Another way is to move the paper away from you and over and beyond the edge of the underneath pieces of paper and then returning to the front edge of the table after the outside edge is pasted. Either method is all right if followed with systematic care. Now when this six feet of paper is pasted, and the paste is rubbed out just enough

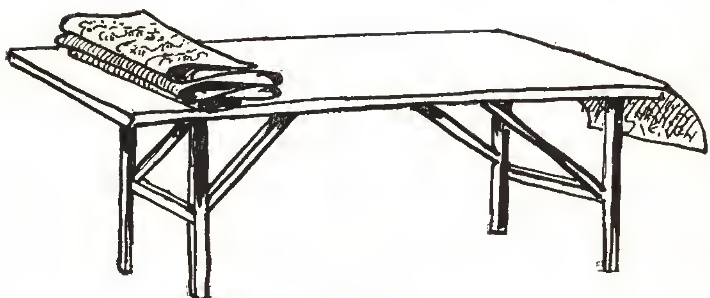


Fig. 8

so that it is not floating around loosely or lying in lumps but has a nice smooth layer of well brushed out paste, it will be next in order to fold it so that this portion of the paper can be moved up to enable you to paste the balance. Take the top of paper in the left hand, grasping the left hand upper corner of the paper with the thumb and second finger and the right hand corner between the thumb and second finger; raise it up to the limit of your reach, which will be about three feet and lay it over the remaining three feet laying on the table. This will bring two pasted portions together. Considerable practice will have to be indulged in before becoming expert in this simple trick. The idea is that when you raise the paper up to the three feet, you are also moving along towards the right hand side of the table

and as you move, there will be just enough air current to blow the paper out mildly, so that it will not collapse from the weight of the paste and fall in a mass of wrinkles. When you reach the foot of the table, gently drop the paper, until the two corners touch the paper on the table evenly, so that the edges just exactly meet; any little discrepancy can be overcome by slight pressure to the right or to the left before the paper is smoothed down. The next step is to fold this over two or three times (see Fig. 8) and pull the paper up again to the head of the table until the bottom of the paper comes even with the foot of table (or right hand end), then proceed with pasting as before.

TRIMMING

After the first breadth (or length) of paper is properly pasted and folded as per instructions, proceed to trim, as follows:

Place the straightedge upon the table just so the folded paper lies under the straightedge and the edge of the straightedge runs evenly along the selvedge of the paper where the printing joins the margin, and by a little close examination the right place to cut will be determined. When the straightedge is properly placed and straight on the line, press down on it with the left hand, making sure that by so doing it will closely grip all portions of the paper, then with the right hand cut through the paper, starting at the foot of the table (at the right) and cutting towards yourself while backing up towards the head (or left of the table). Hold the knife rigidly (See Fig. 9) and at the same angle all of the time until the end of the paper at the top (or left) of the table is reached. If the knife is sharp and held at the right angle and kept close to the straightedge, while the straightedge is held firmly close to the paper, you will have a clean cut trim. In all things, practice makes perfect and trimming paper is no exception to that rule. PRACTICE, PRACTICE, AND THEN PRACTICE SOME MORE. It will take a great deal of patience as well as perseverance before that degree of expertness is acquired which will enable the apprentice to do this all-important branch of the work in a perfect manner.

Once the knack has been acquired, this will prove to be the most superior method of trimming paper.

SHARPENING THE KNIFE

A very important part of good mechanical work is to have good tools and have them in good condition. A paperhanger must not only have a good knife for trimming, but must also, like a good carpenter or cabinet-maker, know how to properly sharpen tools. To keep a paperhanger's knife in good sharpened condition, is a very simple matter. In the first place at least three

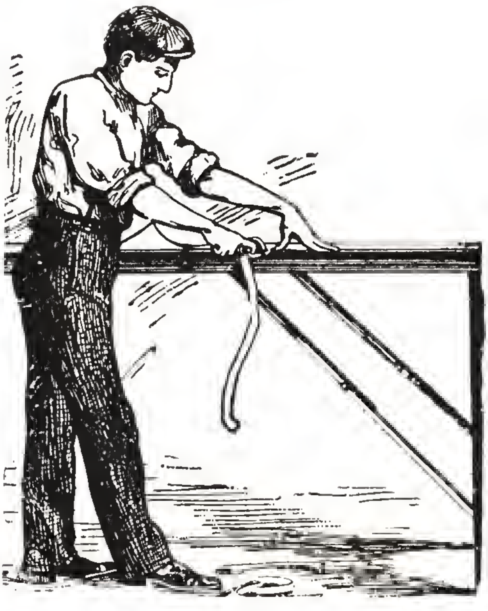


Fig. 9

Fig. 10

trimming knives should always be kept on hand, for reasons which will follow. Upon the top of the straight-edge there should be glued three pieces of emery cloth or paper. These pieces of emery should be of three degrees of texture, coarse, medium fine and fine; No. 1, No. 1½ and No. 0. Rub the knife back and forth, first on the coarse,

then on the medium and finally on the fine. Practice on this the same as honing a razor. This operation should be gone through before each cutting. This will wear the knife down, of course, but will give a good cutting edge. When a knife is well worn down until it comes to a sharp point (See Fig. 10), it will then be in prime condition for cutting heavy materials; hence one of the reasons for having more than one knife on hand. For light weight papers, a rather new and tender knife is just the right thing. (See Fig. 11 in illustration of paperhanger's kit at beginning of this section.)

HANGING THE PAPER

After having thus pasted, folded and trimmed the paper, it is ready for hanging in the following manner. In the pocket of the apron, be sure to have the smoothing brush, seam roller and scissors. Lay the length of paper over the left arm and carry it in this manner to the step ladder which has been previously placed in position in front of the wall where the mark has been made with the chalk line. Walk up the step ladder (See Fig. 12). Take hold of the upper corners of the paper with the right and left hand and let the balance of the paper fall until it strikes the foot, leaving the lower folded half to be attended to later on. Fasten the upper end at the top of wall, allowing several inches to go beyond the top. If the chalk line is on the right hand, fasten the right-hand corner at top while it is hanging thus, loosen up the left hand to adjust the paper until it hangs plumb with the line. When satisfied that it is hanging straight, fasten it at the left-hand corner and then proceed to smooth all of the upper part of paper with the smoothing brush. Brush downwards through the center with one long sweep and then to the right and left with short strokes. Do this gently, without much pressure, especially if the paper is of light weight and thin. This care will prevent stretching or otherwise straining the paper and thus making the matching of the next piece a difficult matter. Proceed to come down the ladder as you do this work, and on coming to the lower folded part, carefully unfold and let drop to the bottom, where it will be found that there are several inches too much of paper. Trim this off after smoothing down the paper

Fig. 12

as you did the upper part. On reaching the bottom, trim off the surplus as follows: Run the back of the scissor blade over the paper, where it joins the base-line and thereby make a mark on the paper which will be a guide for cutting with the scissors, to cut the paper off. If this is done carefully, you will find that the paper fits exactly. Then brush down, but be careful to wipe the paste off the base-board with a piece of cheesecloth, as otherwise the smoothing brush will take some of it up and transfer same to the surface of the paper, which, of course, is a most undesirable thing to do.

MATCHING THE PAPER

Having hung the first piece, then proceed as before to paste, fold and trim the next and succeeding pieces in the same manner. When the second piece is ready to hang, proceed as follows:

Carry the paper to the ladder, as before, having the ladder previously placed. Place the paper at the top as before and when it is straight and in place at the top, come down the ladder and examine the paper midway from the top of the wall to see if it matches well, before brushing it out with the smoothing brush. If it matches all right, fasten it right there in the middle and start the smoothing-out process, brushing upward, where in the case of the first length, you brushed downwards. Trim off the surplus at the top and then come down the ladder and then proceed from the middle downwards and trim off at the base as before. You will note by this that extreme care should be used to see that the paper matches perfectly just at that point where it is opposite to the eye or range of vision.

These directions for pasting, folding, trimming and hanging are practically all there is to the art of paperhanging in the ordinary sense and when the apprentice has gained experience in the hanging of the ordinary grades in accordance with these instructions, he will be ready to take up the handling of the great variety of different high-class grades of paper which are used for the better class of decorative work.

USING THE SEAM ROLLER

After hanging and smoothing out the paper as directed, it will be necessary to roll down the seams and right here is where it is necessary to be very cautious in the use of the seam roller. A seam roller is a small wheel, similar to a chair castor and is made of various materials, of maple wood, hard rubber, celluloid and of ivory and sometimes of iron and in a pinch, an ordinary chair castor could be used. In making the joint, the paperhanger should have his paper just lap the width of a hair and then roll down with the edge of the roller. This rolling should be done gently and without much pressure, as otherwise the object of rolling down the edge will be foiled, inasmuch as the

heavy pressure will be similar to the use of an iron and will make a polished effect and thus make conspicuous what should otherwise be disguised.

SPLITTING THE PAPER

It sometimes becomes necessary to split the paper so that a narrow width can be placed in a space too small to take a whole width. This can be done on the table by measuring and marking the paper with a hard pencil and then trimming with the knife, making sure of course, to move the paper over, so that the cutting is done on the edge of the board. Sometimes it will be necessary to use the scissors for this splitting.

TURNING AROUND THE CORNER OF A ROOM

When the paper comes to the corner of the room, the attempt should never be made to turn the paper around the corner, as it will surely make a mess and will, without question, eventually dry out in unsightly wrinkles. The paper should be cut so that about a half inch will turn around the corner and when this is dry, the next piece can be added. Follow this practice religiously and there will never be trouble because of wrinkled corners.

HOW TO HANDLE THE VARIOUS MATERIALS AND GRADES

The foregoing instructions will carry the apprentice right through the hanging of all smooth finished papers. After experience has been acquired in handling all grades of delicate surfaces on these smooth papers of all grades and range of quality without messing up the surface with paste and wrinkles, he will be ready for instruction in the hanging of the various special types of paper and materials.

When it comes to decorative effects, the paperhanger has to have a wide knowledge and extensive experience, to cope with the demands upon his skill. He will be called upon to hang such special things as all kinds of Pressed or Embossed papers, all sorts of rough textures such as Ingrains and Cartridges, Crinkled Crepes, and all

sorts of heavy materials, such as Lincrusta, Leathers, Burlaps, Painters' Canvas, Buckram, Flocks, Flosses and Velvets. Every year or so, there are new ideas being brought forward and the proper interpretation and application of all of these things will require the utmost of ability possessed by the paperhanger, as well as peculiar qualifications to acquire a reputation for skill as a decorator. In addition to this great variety in texture and quality, there is also an endless variety of special decorative elements such as "crown borders, panel ornaments and bands, scenic papers" which require several sheets of the paper to cover a wall with the completed picture. Some special decorations will require that three or more distinct bands be run around the room to make a complete decoration. The study of all of these things will certainly be of educational value to the young decorator and the successful application of them, after careful study and analysis, will, without question, make out of him more than a "usual workman" and will, in the end, result in his becoming a well-equipped expert decorator.

PREPARATION FOR SPECIALS

In the preceding pages the methods and reasons for sizing preparation have been described, but as a preparation for the better and special grades of paper; it becomes necessary to go one step further in the matter of preparation. All walls should be lined with a special lining paper before applying the better grades of paper. The lining paper is plain white stock of good quality sold by the manufacturers for this purpose and is hung in exactly the same manner as the ordinary grades of wall paper, except that greater care is exercised in having the paste heavy enough not only to carry the lining paper, but also to carry the weight of the other heavy grades which will be hung upon it. The force of this argument can be readily grasped.

CROWN EFFECTS

A very perfect type of paper is what is known as CROWN EFFECT. This is a type of border which is so designed and printed that when applied it gives the paper a perfect finished effect at the top of the wall and avoids the cut off and unfinished effect which the regular type of paper has.

To hang this successfully, requires that the paperhanger first hang the crown and then attach the lengths of paper in succession, to fit the crown. (See Fig. 13.) To complete the effect, some manufacturers make a foot-

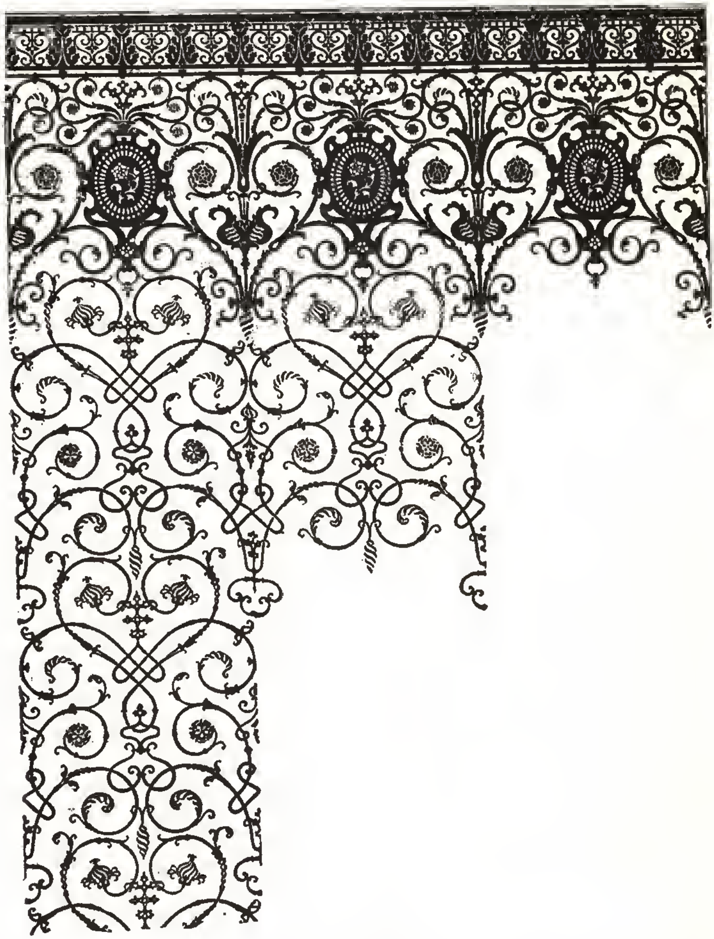


Fig. 13

piece which enables the paperhanger to make a complete decoration at the bottom, as well as at the top. Illustrations of the complete effect usually accompany these novelties.

PANEL EFFECTS

Manufacturers have for a long time been perfecting the bands and corner pieces for the decoration of walls into panels. A great deal of ingenuity has been displayed in the designing of these decorations and requires the greatest amount of skill and patience on the part of the paperhanger, as well as artistic ability. In another chapter, space is devoted to the treatment of this subject.

PRESSED PAPERS

All sorts of experiments have been made during the last fifty years in methods of hanging Pressed and Relief papers, but there is only one right way, following the proper preparation and lining of the walls. To successfully hang pressed paper of any sort, it is necessary to have GOOD PASTE (AND PREFERABLY HOME-MADE). Then apply this paste as heavy as the goods will carry (not in lumps or gobs) and then to get it onto the walls as quickly as possible after it is pasted and trimmed. The lining paper will absorb the paste quickly and hold the paper tight and prevent it from stretching or shrinking. Getting the paper onto the walls quickly will prevent it from absorbing too much moisture itself and consequently prevent it from flattening out and thus losing a large amount of the relief in the embossing. This precaution of getting the paper onto the walls promptly after pasting is a good rule to follow, especially when the walls are lined. Many a delicate paper is spoiled because of losing some of the delicate embossing which so enhanced its effect before being hung. Especially is the need of this method emphasized when hanging all kinds of silk and satin effect lustres, etc.

The young paperhanger will be advised by some of his companions to soak his paper well before applying to the wall, but he must not heed this advice because it is wrong in principle.

FLOCK PAPERS

Flock papers and similar materials such as Floss and light weight Brocaded Felts, must be handled in a different manner from any other paper. In the first place, they must be trimmed dry, before pasting. After being cut into lengths, they are placed upon the table one at a time,

face upwards and trimmed with the straightedge and knife before being pasted. Then the places they are to occupy on the walls are marked off and a thin line of water color, of the same tint as the paper itself, is run down just where the joint comes. In addition to this, the white edges of the paper must be colored with the same thin water color. This has to be done carefully and neatly, but the result will pay for the trouble. Then the instructions given above about pasting and hanging promptly, must also be followed out. In addition to this, great care must be taken in handling the paper while hanging. It must not be rubbed too hard with the smoothing brush, in fact, precaution should always be taken to place a clean piece of newspaper over the flock paper while smoothing it down with the brush and use the smoothing brush in a tapping fashion rather than as a sweep. Too vigorous brushing over the felt or silk floss is apt to remove some of the material, which is liable to be rather soft from the effect of the moisture of the paste.

GRASS CLOTHS

"Grass Cloth" is made in Japan and is thirty inches wide. It is made of woven grass, mounted on rice paper and is rolled in eight yard lengths. The best quality is dyed before being mounted upon the rice paper background. A great deal of it, however, is dyed after being mounted and rolled. In the opinion of many decorators, the material dyed before being woven is the best, but there are some decorators who prefer to buy the grass cloth in the white undyed state. They prefer it in this way, because it enables them to dye the cloth after it is hung upon the walls, and also because they can produce colorings exactly to suit or to harmonize with the other elements of their decorative schemes. It is possible to do this very satisfactorily, with the dyes in liquid state, applied quite thin, with a broad wall painting brush. In fact, the best results are obtained by using a stump of a calcimine brush. These stains may be made by the decorator by using the dry analine powders mixed with water and alcohol, according to directions, usually accompanying the packages. In the absence of instructions, a little alum added to the water or alcohol will harden the stain or dye, so that it will not crock (rub off). This method

of coloring can be done without destroying the natural lustre of the grass, which is one of the results that make the "dyed after being rolled" material inferior to the best quality.

The chief concern of the paperhanger when handling grass cloth, is to procure enough in one lot to cover the walls of a room without too much variation in shade or coloring, as it seems to be next to impossible to produce uniformity of coloring in the material as each roll is a shade darker or lighter. The paperhanger may, however, by careful selection and placing of the various rolls according to tint, produce satisfactory results.

This material has been on the market so long that the buying public has been educated to accept the variation of shades and colorings as a distinguishing mark of originality and quality peculiar to this material. Its popularity, in fact, stimulated the manufacturers of wall paper to produce various types of paper, which have all the artistic effects of color and durability as well, without the one great disadvantage of the original material (rough and dust-catching surface).

Grass cloth is hung in practically the same manner as ordinary wall paper, as it is cut up into lengths, pasted, folded and trimmed with straightedge and knife, in exactly the same manner as instructed heretofore. It should always be hung upon lining paper. When using dark colors it is a good plan to run a one-inch stripe of color wherever the joints may be made. This "trick" of coloring is advisable whenever making "butt" joints on dark colored papers, placed upon a white lining background. No matter how carefully or expertly the work may be done, there will be an occasional separation of even so small as a hair line, which, small as it may be, can be discovered under the glare of a direct artificial light.

HOW TO PAPER CEILINGS

The paperhanger proceeds to paper a ceiling very much in the same manner as for walls, that is to say, he measures and cuts his paper, pastes, folds and trims, in exactly the same manner as for the same work with wall paper. After this part of the work is concluded, proceed with the ceiling, as follows:—

If the room has windows at one end, place the scaffold,

consisting of two step ladders, upon which the plank has been placed, at the end of the room. The plank is arranged so that the ceiling can be touched, easily, with the tips of the fingers. Carry the paper on the left arm and with a half roll of paper in the right hand (to be used as support) get on the scaffold and with the back to the light

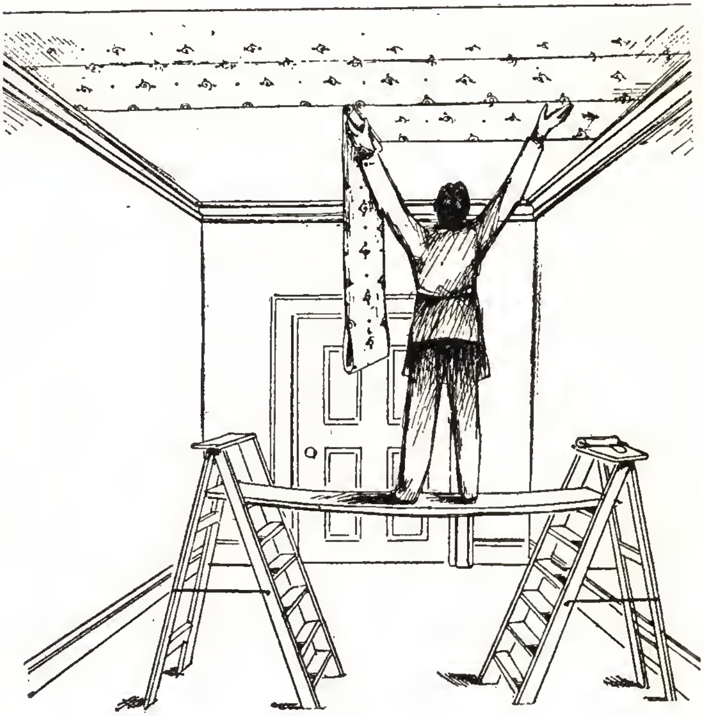


Fig. 14

(see figure), unfold the upper fold and with the balance of paper resting on the half-roll (see Fig. 14) grasp the top end of paper at the right-hand corner and fasten that corner of the paper to the corner of the ceiling, allowing an inch or two to lap over on the wall, temporarily, with the left hand holding the half-roll or stick of paper, which is supporting the ceiling paper, press that part of the ceiling paper against the ceiling and against the angle of the wall where it touches the ceiling over the head

and above the window. Then using the roll as a sweep, travel along the ceiling, unfolding the lower fold and pressing the ceiling paper against the ceiling. By watching the edge of the paper where it touches the wall, the paper can be guided so as to keep it straight. By reference to the illustration, this can be more easily understood than by description.

After fastening it in this temporary fashion, until all of the length is on the ceiling and before cutting off any of the paper where it touches the wall, pull down the first portion, or a part of the first portion and sweep it back with a sweeping brush, smoothly and tightly into the corners and trim off a portion of the part that laps on to the wall. An inch or so must be left, however, to take care of unevenness on line of ceiling. Then proceed to smooth out the balance of paper with sweep brush and trimming as before described. It may be necessary to unfasten the lower portion of the paper when this process of fastening the paper with sweeping brush is proceeding, to remove blisters, wrinkles and crooked paper. All of this work must be done promptly and quickly, while the paste is still soft.

The balance of ceiling is carried on in the same manner, the scaffold being shifted and the position of the paperhanger the same and the method of proceeding the same.

The principal difficulties confronting the paperhanger with this work, is to keep the paper straight and clean and free from wrinkles and other defects and also to keep it free from shines, which come from using too stiff a sweeping brush and working it too hard and vigorously. For ceiling work, the paperhanger should use a wide sweeping brush and rather soft.

BURLAPS AND CANVAS

The expert paperhanger will be called upon to hang various fabrics for decorative purposes; Dyed Burlaps, prepared Canvas and Book Cloth or Buckram, as it is more commonly called.

The method of hanging these materials varies. Buckram and other narrow and light-weight canvas which have to be glue sized, may be cut, pasted and trimmed upon the table, the same as ordinary wall paper, but when

using unsized, extra width and heavy materials, it becomes necessary to paste the wall before hanging the material which is then handled dry and pressed on to the pasted surface, each piece lapped over the other to the extent of an inch or two. The straightedge is then pressed over the two layers, where the joint is to be made and the material is then cut through with a sharp knife. The knife must be quite sharp, in order to cut through the two layers, cleanly, to the wall. After the cutting, the selvedge edges are pulled off and the joint pressed down. As a rule, there will be sufficient paste left under these edges to hold the material, but if by chance it is discovered when lifting off the selvedges that there is a dry spot or two, it will be well to insert a little paste here and there with a small brush, before pressing down the joint. This method of trimming, after the material is on the wall, will be found to be the most perfect method of making a practically undiscoverable joint.

Canvas is also used to cover ceilings and walls as a preparation for painting, calcimining and decorating and the best work with the prepared goods (sized and filled canvas and burlaps) is to proceed in the same manner (pasting and trimming on the wall).

There is another method of using a material as preparation for painting and decorating. The ceiling or wall is pasted and upon it is placed unbleached muslin. The muslin is cut into lengths considerably longer than the space, laid in water and then wrung out. It is then smoothed out on the ceiling or wall surface. After it is smoothed out as good as possible with the hands, it is then finished with a scraping process with a trowel or broadknife. This scraping with a trowel or broadknife, removes all blisters, lumps or surplus paste and brings the muslin into close contact with the surface. Muslin may be procured in widths for most any size wall space and it is therefore possible to cover most ceilings and wall panels by this means, without making a joint, but where a joint is made because of using narrow widths, it should be made in the same manner as described for other canvas work.

There are certain other types of canvas which the paperhanger will be required to hang, such as "Painter's Canvas" upon which it is intended to produce pictorial decoration and also canvas upon which the artist has al-

ready made his picture. This latter is handled in a different manner, insofar as the paste is concerned. The adhesive for this sort of canvas is composed of white lead and varnish and is applied in a "stiff" state, with a wall brush, in an even and smooth manner. The canvas is then smoothed out upon it carefully using the hands and wads of soft cloth and sometimes with a stiff, short-haired smoothing brush or sweep.

HOW TO LAY OUT PANELING

The decorative possibilities of wall paper are unlimited and when handled by a paperhanger of artistic temperament and taste, many original effects may be produced and particularly is this the case when using the various

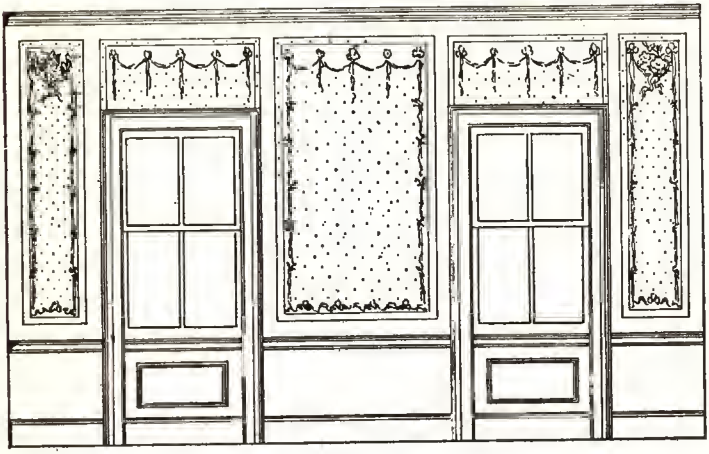


Fig. 15

bands and corner pieces, which are produced by the manufacturers for dividing walls into decorative panels. The young paperhanger who would make the most of his opportunities, would do well to make a study of architectural details. He should study the proportion of panels on doors, wainscoating and furniture. This study which will embrace the comparison of the width of stile, moldings and panels, will enable him to better understand the good effects produceable through carefully considering these points when laying out panels on wall surfaces.

While the mere job of dividing a wall into different

size panels seems to be a simple matter, the successful working out of panels of varying sizes, to produce harmonious groupings, involves more study than appears on the surface and while it is not absolutely necessary for the paperhanger to go into the subject as deeply as an architect, the more knowledge obtained along these lines, results in having more confidence in his own ability and better work be produced. (For example of paneling see Fig. 15.)

Fig. 16 Fig. 17

HOW TO DECORATE WITH WALL PAPER

There is a big difference in just "hanging" wall paper and "decorating" with wall paper.

The paperhanger who knows only how to "hang" wall paper will only be entrusted with the ordinary grade of work, just the routine job of papering one room after another in the same old way, but to the paperhanger who knows how to "decorate" will be entrusted the responsibility of "decorating" wall surfaces and to him will come the reward for producing creditable and original work, acquiring a distinctive reputation and financial remuneration. Opportunity for originality is provided by the introduction of Wainscoats or "Dados" as they used to be called, Upper Thirds and Cut Outs, Special Church and Theatre Auditorium decorations. (See Figs. 16 and 17.)

EMBOSSED AND RELIEF PAPERS

In the preceding chapters, instruction has been given with reference to wall paper of the average grade. As has been indicated, wall paper is made in endless variety, and each season finds the introduction of some new effect, but there are other types of paper such as EMBOSSED or so-called RELIEF papers which are used for a better grade of work than is possible with the ordinary grades of paper.

"EMBOSSED" paper is that type of paper which has been run through a machine to give a sort of ribbed or basket woven effect to the entire surface of the paper.

"RELIEF" paper is the name given to that type of paper wherein the design stands out in relief. Many of these relief papers are finished in colors by the manufacturer. The so-called "LEATHERS" which are universally used for Halls, Libraries, Dining Rooms and public places, are made in this manner. Another type of relief paper is known as "FLOCK" or "FELT." These papers are made so that the design is printed with a varnish sizing to which the powdered felt or flock is attached by a special process.

These papers are used on the better grade of work and require the utmost skill on the part of the paperhanger to produce perfect result. They must be hung upon lined walls, in order that the relief is not flattened out while the paste is drying and the paper thereby shrinking. The lining paper being specially prepared, quickly absorbs the paste, thereby permitting the pressed paper to dry quickly and retain its relief.

RELIEF PAPERS AND HOW TO DECORATE THEM

Ceilings and walls are often covered with plain white relief paper upon which it is intended to prepare and decorate in colors after it is hung. These papers have to be hung just as carefully as those that are finished by the manufacturer, especially when the relief is heavy and the papers are used for panels on ceilings or walls, the paperhanger must be careful to center the designs in order that they may have proper decorative value in conformity with the architecture of the room or building upon which they are being used. After they are hung,

they are prepared for painting by a coat of size, the size being composed of glue and water, the same as advised for use as a preparation for hanging the paper. It is the usual practice of paperhangers, to apply two coats of size for this purpose. When this is done, both coats of size are made weak and thin. The object of putting on two coats of size as a preparation for painting, is to prevent misses or "holidays" as they are called by the decorator; the idea being, that if there is a miss on the first coat, it will be overcome on the second coat and the purpose of using the size weak is to prevent the peeling or chipping which would result if it were made too strong. When the size is dry and thoroughly hard, the paper is then ready for decoration and many combinations of colorings and glazings are then possible. A favorite method of decoration with relief papers, and much in vogue at present, is to paint all of the paper with a rich cream tint and then rubbing over it an umber glaze, which in turn is wiped off with cheesecloth while still wet, thus leaving in the crevices and shadows, a thin tint of umber glaze, thereby producing somewhat the effect of antique ivory. Many combinations are possible and are limited only by the ability of the decorator.

REVIEW AND DESCRIPTION OF TOOLS AND APPLIANCES

As has been indicated in the beginning of this course of instructions, the tools actually necessary for the ordinary routine of work, are few and simple, but there is an endless variety of tools and apparatus which have been invented from time to time to meet special emergencies and to produce work in a more rapid manner, as well as more proficiently under varying conditions.

Ingenious inventors have discovered the weak spots and have devised really meritorious equipment, and while it would not be good judgment on the part of any paperhanger to burden himself with so heavy a load in his traveling kit as a complete equipment of these different conveniences would make, it is nevertheless advisable that the paperhanger who intends to advance to the degree of expertness, wherein he is able to properly handle any grade of material, to invest from time to time in these various improvements and have them stored in his locker at the shop or at home, where he may get them for the

various emergencies that are sure to crop up from time to time.

The "trimming" of wall paper seems to have received very close attention by the inventors, as many machines and devices are sold by the supply houses for this purpose, and while many mechanics hold the opinion that the best work can be produced when the ordinary trimming knife is used by the expert paperhanger, nevertheless the patent wall paper trimmers have their place.

Trimming Wheels that are made to run on special straightedges and which, being self sharpening, require no care in that respect, are very useful for cutting through many layers and the users of these trimming wheels when necessary to hang paper in large quantities and quickly, find these instruments of great value. There are other machines by which the paperhanger can trim

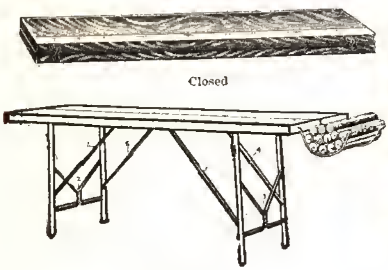


Fig. 19

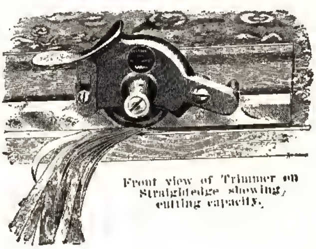


Fig. 18

both sides of the paper before hanging the paper. A large quantity of cheap paper can be trimmed with these machines, thereby saving the time of trimming, and thus making it possible to hang much more paper in a day than could be done if each piece had to be trimmed. (See Fig. 18.)

Straightedges have also been greatly perfected and while it is possible for the paperhanger to have a straightedge made out of one thin strip of wood, he may by the investment of a dollar or two more, procure a metal bound straightedge, which has been built up of three different kinds of wood and is marked off in inches and feet. The average straightedge is made in six feet lengths, also in seven feet and eight feet. In order that the paperhanger may be able to carry a straightedge while traveling on the railroads, they are also made in sections so that they

can be carried in his bag or in a small canvas cover. Other straightedges are made of steel which being quite heavy, lays close to the paper. The advantage of metal edging and all-steel straightedges, is that it keeps the straightedge "straight" and also makes it impossible for the knife to accidently splinter or gouge off a piece, as is the case with a wooden straightedge.

Folding Paste Tables: There are many varieties of folding paste tables. These tables are made of wood. The most popular type are made of half-inch thick material and of three strips, ten inches wide by six feet long. These are placed upon folding trestles. (See Fig. 19.) They are light in weight and easily handled and one principal advantage that they have is that the cutting edge can be changed twelve times because of each strip having four cutting edges. Another type of table is called the folding paste table, built somewhat on the plan of the folding table used by the housewife for sewing. The legs when not in use, fold under the table. The supports for both of these tables are so adjusted that when necessary, an additional strip of wood may be added when using extra wide papers.

Plumb Bobs and Spirit Levels: One of the most ingenious devices for a very important department of a paperhanger's work is the SPIRIT LEVEL which can be attached to the straightedge, by which it is possible to mark the lines on the wall perfectly plumb and quicker than would be possible by the old-fashioned method of hanging a plumb line and snapping of the line with charcoal powder.

Paste Brushes: While there have been attempts to invent a pasting machine, none has yet been found practical and we find today that the best tool for spreading paste upon the paper is a wide, good quality calcimine brush. (See Fig. 20.) The paperhanger, by grasping this brush at the stock, can quickly spread the paste in an even manner upon the paper. Sometimes it is found advisable to make it lighter in weight and easier to carry in the tool kit, to cut off most of the handle and in fact, special brushes without a handle, but with a good grip (See Fig. 21) specially devised, may be obtained.

Measuring Rules: While the straightedge, six feet long, marked off in feet and inches, can be used for measuring the height of the wall, it is too cumbersome and un-

wieldly for all the purposes for which a paperhanger needs a rule, so that he has use for the old-fashioned boxwood rule, two feet in length, which folds up on six-inch sections, and the Zig-Zag rule. This rule is very useful to the paperhanger, being light in weight, and folding up in six-inch lengths; it can be had from three feet up to eight or nine feet in length.

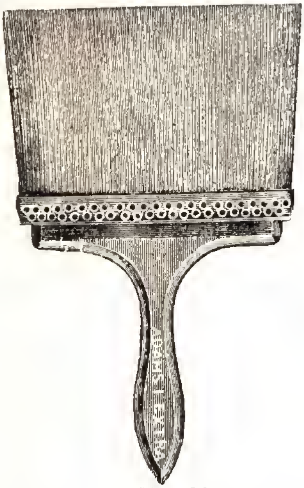


Fig. 20

Fig. 21

Seam Rollers: Many varieties of seam rollers are made. They are made of Wood, Metal, Celluloid, Ivory and Rubber, and are made oval, flat or beveled. Some paperhangers prefer the oval, while some prefer the flat. The bevel faced roller is especially designed to enable the paperhanger to smooth down the angles and to get in close, in confined spaces. They come in all widths, the

Fig. 22

wider kind being used for rolling down the seams of Flocks and Felts; the very narrow kind being used for rolling down the seams of delicate papers. It is impossible to advise the paperhanger on the selection of the seam roller, as every man has his preference. Some of

the rubber rollers have scalloped edges or fluted face, as the manufacturer terms it. There may be special needs for this special type of roller. (See Fig. 22.)

Smoothing Rollers: It becomes necessary to use a roller to prevent the roughening or shining of the surface of wall papers by the use of the sweep brush and for this purpose there are a variety of rollers obtainable. (See Fig. 23.) These rollers have heavy steel frames and large handles and are covered with felt or soft cloth.

Casing and Corner Knives: Some paperhangers have become quite expert in the use of these special casing and corner knives. The use of these knives which are rotating and have wheels attached, and metal handles, saves time and trouble of cutting with the scissors at the base-board. There is also an endless variety of these knives (See Fig. 24) and it is difficult to pass judgment on which is the best as every paperhanger will have his preference.

Sweep Brushes: Every paperhanger should have in his equipment at least five sweep brushes, although it is possible to get along with one. These brushes are made in several lengths and different kinds of material. For heavy and ordinary grades of papers, a rather stiff brush is needed, of about seven inches in length. The paper-hanger should have two of these in order to have one clean brush at hand, when the brush in use becomes clogged up with the color from the surface of the paper, which causes the brush to scratch the surface. For delicate papers, he should have a soft haired brush of the same length and also two of these for the same reason. For ceiling work he should have an extra long and soft bristled brush. (See Fig. 25.)

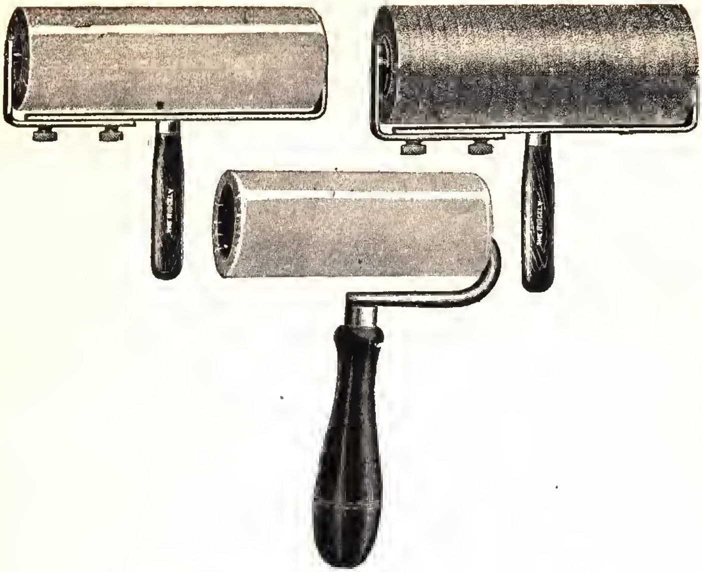


Fig. 23

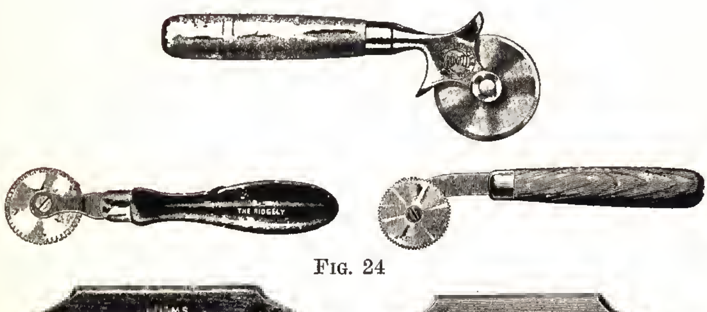


Fig. 24

Fig. 25

Question. When was wall paper first invented?
Answer. The early part of the First Century.
Q. By whom was it invented?
A. By the Chinese.
Q. When was wall paper introduced into United States?
A. About one hundred and seventy years ago.
Q. How was it made?
A. It was made on large sheets of paper and the patterns were painted by hand.
Q. Where, in this country, was it first used?
A. On the walls of a house in Dedham, Mass.
Q. What kind of tools were used at that time?
A. There is no record of any special tools.
Q. What tools are needed by the paperhanger for ordinary work?
A. A pair of scissors, paste brush, paste bucket, smoothing brush, paste boards, broadknife or scraper, straightedge, measuring rule, plumb bob and chalk line, step ladders of varying heights, lead pencil, charcoal, crayons, etc. (A suit or two of overalls, containing a pocket to carry the tools.)
Q. What else should the paperhanger have besides these tools?
A. He must have Patience, habits of Thoroughness and Cleanliness.
Q. Are these all the tools that are needed?
A. No, there are other improved tools for special work.
Q. What must the paperhanger do before hanging wall paper?
A. He must prepare the walls by sandpapering, pointing up with plaster, and sizing.
Q. What else must the paperhanger do before hanging the wall paper?
A. He should measure the walls carefully to determine the exact quantity needed and he should examine the paper to see if it is perfect in every way before cutting. He should scrape or remove all the old wall paper or old calcimine that may be on the walls before attempting to hang the new paper.
Q. How is the old paper to be removed?
A. The old paper is removed by being wet sufficiently with water applied with a brush.
Q. Is there any other way of removing paper except by this method?
A. Yes, the paper may be removed by the use of steam.
Q. If the old wall paper is varnished or painted, how can it be removed?
A. The old varnish or paint must be removed before the paper can be softened with water and it can be done by using varnish remover or a solution of hot water and soda or hot water and ammonia.
Q. How is old calcimine removed?
A. It is removed by first wetting the old calcimine with water and washing off with a sponge. Where it is too hard to be removed in this manner, it must be scraped off with a painter's broadknife or scraper.
Q. How are walls prepared?
A. After the old paper or calcimine is scraped off, the walls are prepared with a sizing of glue and water.
Q. If the walls are painted, how are they prepared to receive the paper?

A. By applying a coat of glue size and water to which has been added some molasses or brown sugar, after the gloss of the paint has been removed with sandpaper.

Q. How is paste made?

A. Paperhanger's paste is made of the best wheat flour and boiling hot water. The flour is first mixed with cold water to which has been added a little alum, and then the well-beaten mixture is transformed into paste by the addition of boiling hot water.

Q. How is the paste prepared for extra heavy papers?

A. The regular paste is made extra adhesive by the addition of Venice Turpentine, added to the paste while it is hot.

Q. How do you measure a room for wall paper?

A. By first measuring the height of the wall and then the number of widths of paper required to cover the four walls of the room, after which, a roll being 24 feet in length, the height of the room is divided into the length of the roll of paper to determine the number of lengths to a roll. This result, divided into the number of breadths required for the four sides of the room, will give the exact number of rolls of paper.

Q. How do you cut the paper?

A. Place the roll of paper upon the table. Cut off the bottom of the paper, according to the pattern. Unroll the paper towards the left of the board, which is six feet. Move it to the right until it touches the floor, then unroll again to the left and cut off the required length.

Q. What special method is pursued?

A. The design of paper is examined to determine where the top of design should be cut to advantage.

Q. What other form of preparation than sizing is necessary?

A. Walls should also be prepared with a lining paper where the paper is expensive or heavy.

Q. How do wall paper patterns differ?

A. Some of the patterns are "straight" patterns and others are "dropped" patterns.

Q. What is the difference between a "dropped" pattern and a "straight" pattern?

A. A straight pattern is one in which the pattern matches on opposite sides of the paper, but a dropped pattern matches diagonally, above and below.

Q. In what other way would you describe differences in variety of patterns?

A. Geometrical designs and Floral designs.

Q. How do you determine the top from the bottom of a wall paper design?

A. By carefully studying the design, to determine by the drawing, light and shade and other identification marks.

Q. What are the first steps in the process of handling wall paper?

A. Set up the paste table and place upon it the wall paper, face down, with the top of the paper at the left. The paper is then pasted, folded and trimmed.

Q. How is the paper pasted?

A. By applying the paste with a short calcimine brush and using the paste as heavy as the paper will carry and well brushed out.

Q. Why is the calcimine brush used for pasting?

A. Because it will carry enough paste to paste a length of paper

without undue loss of time dipping into the pail, which would be the case with a smaller brush.

Q. How is the paper trimmed?

A. It is folded, with the pasted sides of the paper brought into contact with each other, upon which is placed a straightedge, pressed down closely, held tightly with the left hand, the knife held in the right hand, pressed against the edge of straightedge. Starting around the right, the paper is cut while moving backwards towards the left.

Q. Why should there be no support under the center of the paste table?

A. The supports for the paste table should only be at both ends, in order that there may be springiness to the boards and straightedge, to enable the straightedge to grip the paper closely and tightly to the board, to prevent wrinkling when cutting.

Q. How is the trimming knife sharpened?

A. By being rubbed back and forth on emery cloth or paper which has been previously cemented to the top of the straightedge.

Q. After the paper is pasted, folded and trimmed, what is the next step?

A. To determine the right place to start to hang the paper.

Q. Where is the right place to start?

A. Usually at the front or that part of the room nearest the windows, or between the windows.

Q. Why do you start to paper at the light?

A. Because starting at the light prevents a shadow being cast by any slight lapping of the paper.

Q. What would happen if you began the hanging of the paper in the rear of the room?

A. Any slight lapping of tho paper would cause a shadow to be cast on the seam, which would make the joint conspicuous for that reason.

Q. How do you proceed to hang the paper?

A. The folded paper is carried on the left arm to the top of tho ladder. The upper fold is then separated and the bottom fold of the paper is allowed to drop carefully until it strikes the left foot. The paper is then held between the thumbs and forefingers of both hands and placed upon the wall by securing the upper left-hand corner on a line previously made. The upper right-hand corner is held free from the wall and the paper is then adjusted by moving to the right or left, using the right hand to guide the paper and the left hand to fasten it at the joint.

Q. What is the next step?

A. When the paper is thus adjusted, it is smoothed down with the smoothing brush or sweep, starting at the top and brushing down in the center and then brushing out to the left and right.

Q. How is the paper trimmed at the bottom?

A. The pasted sides of the bottom fold are separated and the paper is then brushed up with the sweep and a crease made with the back of the scissors on the paper where it joins the base-board and then cut along the line thus made, after which it is brushed down with the sweep.

Q. After making the joint, how are the joints brought together or pressed down?

A. The joints are brought together or pressed down with a seam roller.

Q. What is a seam roller made of?

A. Seam rollers are made of Ivory, Celluloid, Rubber, Wood and Metal.

Q. What caution should you take when using a seam roller?

A. The seam roller should not be pressed too heavily nor too often on the joint, as too much pressure causes a polish or shiny mark.

Q. How is paper split or cut after being pasted to fit a certain narrow space?

A. The width is marked off with a pencil at two points at top and bottom of the paper and then cut with knife and straightedge along the line thus made.

Q. How would you turn the paper around the corner of a room?

A. The paper should never be turned around the corner. Where the space between the last seam and the corner is narrower than the width of the paper, the paper is cut to fit the space and lapped to the extent of about half an inch and the remaining piece of paper is matched to it on the other side of the wall.

Q. What are the varieties of wall paper?

A. The varieties of wall paper are as follows:—

Blanks, Flats, Grounds, Gilts, Embossed, Ingrains, Cartridges, Crinkled Crepes, Pressed, Lincrusta Leathers, Flocks, Flosses, Velvets and Grasses, as well as various fabric effects.

Q. Why should we use special lining paper?

A. Because some papers are damaged if permitted to remain damp and become soft while drying.

Q. How does the lining paper prevent this damage?

A. The lining paper being porous, absorbs the paste quickly and thereby removes the danger of slow drying and softening of the wall paper while drying.

Q. For what other reason should lining paper be used for Pressed or Embossed papers?

A. To prevent the embossed relief effect from flattening out through shrinkage.

Q. What special type of paper is made to give a finished effect to the design at top of wall.

A. Crown papers are made for this purpose.

Q. What is a Crown paper?

A. A Crown paper is so designed that the border or frieze matches the design of the wall paper so that it continues the design to a finished effect.

Q. What special types of decorations are made in wall paper?

A. Borders, Narrow Bands, Corners and Applique Ornaments, to produce paneling.

Q. Are there any other special decorative effects obtainable with wall paper?

A. There are Scenic papers and various details consisting of Columns, Capitals, Bases, Rails, Arches, etc.

Q. What are these details used for?

A. For the decoration of public buildings, stores, etc.

Q. Are paperhangers required to hang other materials than wall paper.

A. Paperhangers are required to hang Burlaps, pressed canvas, and book cloth or buckram.

Q. In what way does the hanging of canvas differ from wall paper?

A. If the canvas is light in weight and filled or sized and of narrow width, it is pasted, folded and trimmed, the same as wall paper, but if made of heavy or wide goods, the wall is pasted instead of the paper or canvas.

Q. How is canvas, hung in this manner, trimmed?

A. It is trimmed while the canvas is on the wall, with straightedgo and knife.

Q. What other method is used in hanging certain types of canvas?

A. Certain types of canvas, such as canvas which has been decorated and canvas upon which pictorial work is to be executed, is hung the same as heavy burlaps, except that instead of using paste, a mixture of white lead and varnish is used.

Q. How would you proceed to lay out walls for paneling?

A. Mark off the panels on the walls with chalk line and straightedge, making sure that the "stile" should not be the same width as the decoration, but should be divided according to the size of the wall, in such a way that the stile should be of different widths, varying from half the width of the panel decoration, up to twice the width.

Q. What is meant by "decorating" with wall paper.

A. The use of panel borders, applique ornaments, scenic friezes, crown effects, upper thirds, wainscoats and picture moldings, as well as the special applique ornaments and architectural details for the decoration of public buildings.

Q. What is meant by Embossed papers?

A. Embossed papers are papers run through a machine after printing to produce a ribbed or woven effect.

Q. What is "Relief" papers?

A. "Relief" papers is the term used to designate that type of paper where the pattern is embossed or brought out in relief.

Q. What sort of special preparation is made for the use of "Relief" papers?

A. The walls are prepared after sizing with lining paper.

Q. Why is lining paper used?

A. To quickly absorb the paste and thereby prevent the shrinkage and flattening out of the embossing.

Q. How are Relief papers prepared for decorating?

A. Relief papers are given two coats of glue size before painting and decorating.

Q. Why are Relief papers sized?

A. To stop the suction and fill up the pores of the paper.

Q. Why is it advisable to apply two coats of glue size.

A. To make certain of covering every part of the paper.

Q. What would be the result of applying only one coat of size?

A. The size being without color, it is difficult to make sure of covering the entire surface without leaving spaces uncovered with the size. The paint would then soak into spots and show clouds and streaks.

Q. How are Relief papers decorated?

A. By the use of Oil Colors, Bronzes and Metal Leaf, the designs are picked out and sometimes an antique ivory effect is produced by paint and glazing colors.